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Documentation Technology Report

April 1994

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Documentation Technology Evaluation Project

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Preface

The purpose of this report is to increase awareness and understanding of documentation technology. Use of this report should be the first step in transferring effective documentation principles, methods, and products into practical use. The target audience of this report consists of those managers and technical people responsible for the development and maintenance of software in their organizations. This report defines the concepts of the Documentation Domain and identifies their value in improving software quality and productivity. It explains how the capabilities of current documentation products can improve management of software development and maintenance projects. It includes information about specific products in the marketplace. Also included are case studies of organizations that are using Documentation Domain technology. The information is aimed at those who must make decisions about acquiring advanced technology and who must prepare their organizations to use it effectively. Finally, this report attempts to identify the future directions of the field to help in planning long-range strategies.

The *Documentation Technology Report, March 1994* is updated from the *Documentation Tools Report, March 1993*. The structure of the document has been changed and new information has been added. The new information presents the complementary relationship of document publishing to document management and places increased emphasis on document management; this is especially true of the Tutorial section. The product lists have been updated. New product sheets, product critiques, and case studies are included. The following table shows the changes to the structure of the report.

1994 section or paragraph	1993 section or paragraph
1 Tutorial	2 Tutorial
6 Case Studies	Appendix F: Case Studies
7 Domain Trends	3.1 Domain Trends
Appendix A: Introduction to the STSC	1 Introduction
Appendix B: Product Lists	Appendix A: Product Lists
Appendix C: Product Sheets	Appendix B: Product Sheets
Appendix D: Product Critiques	Appendix C: Product Critiques
Appendix E: Reserved	not applicable

1994 section or paragraph	1993 section or paragraph
Appendix F: Training and Services	Appendix E: Training
Appendix G: Glossary	Appendix G: Glossary
Appendix H: References and Recommended Readings	Appendix D: References and Recommended Readings
Appendix I: Document Management Characteristics	new
Appendix J: Capability Maturity Model Documents	new

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1 DOCUMENTATION TECHNOLOGY DOMAIN TUTORIAL

1.1 Purpose of this Report and of Software Documentation

1.1.1 Purpose of this Report

The purpose of the STSC Documentation Technology Report is to inform the reader about:

- the documentation domain terminology
- the types of documentation tools and technologies available
- lessons learned in applying documentation tools and technologies to real projects
- resources the reader may use to learn more about the documentation domain

This document does **not** specifically cover the software documentation management principles and methods that a Department of Defense (DoD) Program Manager should know and follow, since they are found in the STSC Software Management Guide Vol. I section 5.0.

1.1.2 Definition and Purpose of Software Documentation

For the purposes of the STSC Documentation Technology Report we use the FIPS PUB 105 definition of software documentation, which is:

All information that describes the development, operation, use, and maintenance of computer software. This information is in a form that can be reproduced, distributed, updated, and referred to when it is needed. [FIPS105]

The purpose or need for good software documentation is based on several assertions, the first being that software is the most appropriate way to implement many system functions. Second, because of the complexity of the systems involved, software cannot be developed without *communication* between project members and with project management.

Software engineering is no longer a matter of a closed community of highly talented inventors of program code, it is much more a question of managing the processes of creating informational systems and carrying about the methods to do so. [Koch 92].

The third assertion is that documentation is an appropriate vehicle for much of the *communication* between project members. Fourth, an individual cannot effectively maintain or use software without some *understanding* of that software [Basili 84] and that, again, documentation is an appropriate vehicle to communicate that *understanding*[Hager 89]. Fifth, a feature of documentation that makes it appropriate for assertions three and four is its longevity i.e. it is more permanent than word of mouth. Lastly, an *understanding* of the software is needed as long as the software is being maintained and used. [Oman 92]

1.2 Background: Document Components, and Publishing vs. Managing

The components of traditional documents (listed hierarchically) are: characters, words, paragraphs, and pages. In this tutorial, documentation tools will be considered in terms of their functionality with these document components.[Ressler 93].

1.2.1 Logical and Visual Aspects of Document Components

It is also useful to our consideration of documentation tools to note that document components have various aspects including cosmetic, syntactic, and structural aspects. For example, characters are symbols that may be concatenated according to the rules of a given language to form words. But characters also have cosmetic aspects such as bolding and italics. Documentation tool functionality is discussed in terms of these various aspects.

1.2.2 Characters

Characters are encoded as a series of ones and zeros. The most common encoding is ASCII. This encoding is invisible unless you try to exchange documents with ASCII encoding with a tool that expects some other encoding such as EBCDIC.

The process of converting the encoding to a display may be performed by hardware or software. The hardware approach is referred to as a *character-based* display while the software approach is referred to as *graphical*. The graphical approach requires more computing power but provides greater flexibility. The graphical approach is seen in the fonts that allow many sizes and appearances of a given character.

1.2.3 Words

Characters have little meaning until they are concatenated to form words. Editing tools (editors) such as Qedit, Vedit, KEDIT provide functionality focused mainly on the logical aspects of words. Using a character-based display, they do little in regards to character

appearance other than provide upper case, lower case and bolding. They are very good at what they do; that is providing editing functionality without encumbering the user with a lot of unneeded features that use disk space, memory, require additional documentation and may never be used anyway.

Other documentation tool functionality related to the logical aspects of words are the spell checkers, grammar checkers, and thesaurus features often found in word processors.

The visual aspects of words are manipulated by word processors, desktop publishers, and page layout tools. These use fonts to vary the appearance of the characters and to vary the spacing between the characters. Typically, word processors or editors are used to generate text in a raw form, that is to create the logic or message of the document. A page layout tool or desktop publisher is targeted on providing multiple columns of text with graphics and fine tweaking of white space, line spacing and kerning to produce the correct aesthetic look of the page.

1.2.4 Paragraphs and Pages

Emphasis on the paragraph component of documents is provided by the tools based on SGML (Standard Generalized Markup Language defined in the glossary) and to a less formal extent by some desktop publishers. Paragraphs can be given a name or tag that describes the content of the paragraph; a name such as "scope", "intro", or "body element for SRS (Software Requirements Specification)".

Page focused functionality is provided by word processors, desktop publishers and page layout tools as just described in 1.2.3.

Electronic distribution products allow a page with the graphics and white space to be displayed that is visually faithful to the hardcopy; this on display devices that do not have the software application that generated that page. This means your transmittal of a WordPerfect document to a recipient who lacks WordPerfect is viewed by both yourself and the receiver in the same New Roman font..

1.2.5 The Document

Continuing our discussion of words, paragraphs, pages, and documents -- page numbering, table of contents, lists of figures, indexes, running headers, and footers exist at the document level but not before. *Document* focused functionality is found in the previously and

often mentioned word processors and desktop publishers. It is the versatility of these two subdomains that contributes to their domination of the documentation domain. They include functionality for all the document components: character, word, paragraph, page, and document.

1.2.6 Blocks

A final note before leaving the concept of document components. The traditional document is being complemented by alternate approaches to documentation that do not use the page metaphor. Electronic displays of "blocks" of hypertext are seen in database publishing tools, forms, hypermedia, SGML-based documents, design records and on-line documentation. Functionality related to blocks includes linking capability and navigational aids. Beyond the comforting structure and confining format of the page, both the writer and reader face new flexibility and challenges.

1.2.7 The Publishing Task

There are two major types of documentation tasks: publishing and managing. *Publishing* deals with producing a document. Publishing is characterized by the terms formatting, spelling, writing, generating text, document structuring, word processing, and desktop publishing. When a Software Requirements Specification is generated according to DoD-Std-2167A, publishing is being done. Publishing focuses on individual documents, though the act of publishing may be repeated several times to generate several documents.

1.2.8 The Managing Task

In contrast to publishing, *managing* deals with groups of documents. Managing deals with controlling many documents so that the production, distribution, transmission, review, archiving, reuse and maintenance of the documents is possible, orderly, and efficient. The managing of documents is characterized by the terms configuration management, imaging, text retrieval, and workflow. "Document management" is the term used in the Documentation Domain to encompass the above tasks. [Sorensen 94]

1.2.9 Tasks Covered by the Subdomains

The scope of the STSC Documentation Domain is broad enough to require the identification of the following subdomains: Color Publishing, Database Publishing, Desktop Publisher, Document Management, Editor, Electronic Distribution, Extract from Source Code, Filter/Translator, Flowcharting, Forms, Graphics/Presentation, Hypermedia, Integrated Office Automation, Miscellaneous, Page Layout, Scanning, SGML-Based/CALS, Technical Drawing, Text Processor/Batch Compiler, Word Processor, Word Processor Add-ons, Workflow, and

Workgroup (Groupware). The tools that are used in these subdomains are defined in section 1.3. Some of these tools cover document publishing tasks only, some cover document management only, and some cover both publishing and managing. Table 1-1 is provided to show which subdomains' tools cover which tasks.

PUBLISHING	MANAGING
Color Publishing	
Database Publishing	
Desktop Publisher	
	Document Management
Editor	
	Electronic Distribution
Extract from Source Code	
Filter/Translator	
Flowcharting	
Forms	
Graphics/Presentation	
Hypermedia	
Integrated Office Automation	
Miscellaneous	
Page Layout	
Scanning	
SGML-Based/CALS	
Technical Drawing	
Text Processor/Batch Compiler	
Word Processor	
Word Processor Add-ons	
Workflow	
Workgroup (Groupware)	

Table 1-1. Subdomain Task Coverage

1.3 Software Documentation Subdomains

The subdomains are identified in the following sections alphabetically.

1.3.1 Color Publishing

Color publishing products provide color separations for high quality color hardcopy.

Examples: Alias, Full Color Publisher

Applications: Color publishing products may be useful in producing color portions of technical orders.

1.3.2 Database Publishing

Database publishing refers to the production of documentation using automated methods to extract information from a database for inclusion in that documentation.

Examples: BASISplus

Applications: Database Publishing products may be used in a software development process where text is retrieved from a database to produce portions of a DoD-STD-2167A documents

1.3.3 Desktop Publisher (DTP)

Desktop publishers provide full screen editing (often with a what-you-see-is-what-you-get interface), graphics manipulation and editing, graphics anchoring to text, multiple text columns, font variety, structuring of complex documents, hanging indents, and precise control over kerning, and may provide close coupling with one or more Computer Aided Software Engineering (CASE) products.

Examples: FrameMaker, Interleaf

Applications: Use desktop publishers for software development projects with resources and a life cycle that justify a higher end desktop publishing product; also for projects that use other CASE products and for production of structured technical documents that include graphics.

1.3.4 Document Management

Document Management products focus on the manipulation and organization of large collections of documents. Document Management products may include indexing, version control, and search and retrieval capabilities.

Examples: Metamorph, RDM.

Applications: Used in the implementation of libraries or repositories where paper is being replaced by electronic media. Document Management products may also be used in the configuration management and archiving of software documentation associated with software maintenance projects that have a long life cycle with frequent and/or significant updates. Note that configuration management is addressed in the *STSC Configuration Management Technology Report*.

1.3.5 Editor

Editors may be line oriented or may be full screen editors. They tend to require less hard-disk space than word processors and may be faster than word processors for searching large files. Some editors allow execution of compilers, linkers, and debuggers without exiting the editor. Specialized language sensitive editors enforce the syntax of specific programming languages.

Examples: EDT, VI, Qedit, Microstar

Applications: Use editors for entering program code and for writing letters and short documents.

1.3.6 Electronic Distribution

Electronic distribution products allow documents to be transmitted electronically complete with graphics and formatting; the recipient's display is independent of application or platform. This means that the receiver can view a WordPerfect document, for example, without having WordPerfect on his/her machine.

Examples: Acrobat, Replica

Applications: Use these to distribute information that does not need to be edited at the receiving end. An electronic distribution process may be implemented using these products to distribute documents for review or printing where there is no need to edit the documents at the receiving end of the distribution.

1.3.7 Extract from Source Code

Extract from Source Code products provide textual or graphical documentation based on information in the programming language source code. An example is a product that extracts comments from source code or captures design information (reverse engineering).

Example: DocGen

Application: These products may be useful if source code documentation is non-existent or of poor quality. The STSC's *Reengineering Technology Report* discusses efforts to provide documentation for existing systems that lack adequate documentation.

1.3.8 Filter/Translator

Filters/translators are products that modify the format of an input file (text or graphics) and produce an output file in another desired format, e.g. a document in WordPerfect format may be converted to a FrameMaker format. No attempt is made to differentiate between filter and translator in the Documentation Domain. Many word processors and DTPs include filtering functions.

Examples: Filtrix, SGML Translation Products, Hijaak

Applications: Filters are used when data from a product in format *x* is needed as input to another product in format *y*. A filter may be used to convert a file to a Continuous Acquisition and Life-Cycle Support (CALS) compliant format. Filters used specifically for software testing applications are discussed in the *Test Preparation, Execution, and Evaluation Technologies Report*.

1.3.9 Flowcharting

Flowcharting products are designed specifically for making flowcharts. The *Reengineering Technology Report* and the *Requirements Analysis and Design Technology Report* may be consulted for more information on flowcharting.

Examples: EasyFlow, allClear, DiagramMaker

Applications: Use flowcharting products where flowcharts are currently being generated manually.

1.3.10 Graphics/Presentation

The Graphics/Presentation Subdomain includes paint, draw, and presentation packages. Some word processors and DTPs include paint and draw functions. Draw function allows a user to select an object from a menu (e.g., a circle or square) and manipulate it to alter size shape or placement. Paint functions work with images as bit-maps, allowing free-hand sketching and pixel-editing. Presentation products represent numerical information as pie charts, bar charts, and histograms.

Examples: CorelDRAW, Harvard Graphics, Power Point

Applications: Graphics/Presentation products may be useful for flowcharts, data flow diagrams, and images of the computer hardware. Presentation products are used to communicate project status to decision makers.

1.3.11 Forms

Forms products provide framework forms with the facility to create, edit, modify the forms and the entry of data on the forms.

Examples: PerForm, WordPerfect InForms

Applications: To generate and track software problem reports and change requests.

1.3.12 Hypermedia

Hypermedia as a documentation subdomain refers to products that allow the integration of several forms of information including text, graphics, video, animation, music, voice and sound. The information is linked non-sequentially to provide flexibility to the user receiving the information. Hypertext is a related term applied to textual information that is linked, usually by pointers.

Examples: HyperCard, AnyImage

Applications: Hypermedia products could be used in users manuals, requirements documents, design documents, test documents, and maintenance documents.

1.3.13 Integrated Office Automation

Integrated office automation products often provide an integrated product with two or more of the following applications: word processing, spreadsheet, database, draw, paint, and mail. Because the applications are integrated, data may be linked between applications allowing updates in one application to be reflected in another application. A spreadsheet may have data that needs to appear in various documents. The spreadsheet updates will appear in all the documents that are linked to the spreadsheet.

Examples: Microsoft Works, PFS:Choice, Framework, Enable

Applications: Use integrated office automation products for projects where the same data may need to be used in spreadsheets, briefings and structured documents.

1.3.14 Miscellaneous

This subdomain includes any product not found in the other subdomains that may be used to aid the software documentation process. Examples of the types of products included are acquisition documentation products, on-line documentation generators, documentation generators, document comparers, and modules of CASE products whose functionality is specific to documentation.

1.3.15 Page Layout

Page layout products emphasize features that allow flexibility in the placement of headers, footers, multiple columns, and graphics on a page.

Examples: Adobe Illustrator, Archetype Designer

Applications: Page layout products may provide the DTP functions that a specific word processor lacks without incurring the expense of a high-end DTP. They are also good for newsletters and short documents.

1.3.16 Scanning

Scanning products are software used to convert hardcopy images to an electronic form. They require specialized scanning devices. The images may be converted into text or graphics. The result of the scanning process may be graphics stored in a raster or vector format, text treated as graphics (stored in a raster format), or text stored in an editable ASCII format.

Example: Omnipage

Applications: Projects with hardcopy that should be converted to electronic media for best usage.

1.3.17 SGML-Based/CALS

Includes products whose functionality hinges on SGML or other CALS standards. Product functionality may include editing, viewing, conversion and validation of SGML/CALS compliant data. Standard Generalized Markup Language (SGML) and Computer-aided Acquisition and Logistics Support (CALS) are defined in 2.7.

Examples: FastTag, Omnimark.

Applications: Projects that have a documentation requirement to be compatible with CALS standards; also projects that involve several organizations that need to exchange data and would benefit from having access to data in a common database.

1.3.18 Technical Drawing

The Technical Drawing subdomain includes computer-aided drawing products that are used for drawing straight lines and bezier curves and for dimensioning. Some DTPs include these functions.

Examples: Generic CADD, Illustrator, MapCon

Applications: Technical drawing products may be used to produce drawings of hardware associated with the software being developed.

1.3.19 Text Processor/Batch Compiler

Text processors and batch compilers accept text files containing embedded codes that are interpreted as formatting information; the text file which results after the formatting information has been interpreted is in a format that can be sent to a printer or display device. A user may generate the input file using an editor, a word processor, or the editing function of the text processor or batch compiler. Text processors and batch compilers are capable of producing high-quality, complex, structured documentation. They can be less expensive than high-end DTPs, but they are also more difficult to use since the user needs to understand the formatting codes to generate or modify a document. In the past, the portability of documents produced by this subdomain was an advantage since it permitted a document to be produced compatibly on different machines, but that advantage is now available via the Standard Generalized Markup Language (SGML).

Examples: Eroff, Documenter's Workbench

Applications: If a project lacks the funds for a high-end DTP but has a requirement for high quality complex documentation involving multiple authors, a text processor or batch compiler may be useful. The most likely project would already have personnel with expertise in this subdomain or would allow personnel plenty of time to climb the learning curve. The trend is away from this subdomain and toward the DTPs.

1.3.20 Word Processor

Word processors provide easy text editing and are typified by full screen editing, cut and paste, word wrap, justification, search/replace, and spell checking.

Examples: Microsoft Word, WordPerfect, Ami Pro

Applications: Use word processors for creation of input files to DTP and text processors and for creation of structured documents of less than 100 pages.

1.3.21 Word Processor Add-ons

These products augment the functionality of a word processor or desktop publisher and may include grammar checking, spell checking, templates, fonts and clip art.

1.3.21.1 Grammar/Spelling Checker

Grammar and spelling checkers are typically used and often bundled with word processors or desktop publishers to evaluate the style of writing and to catch typos. Spelling dictionaries may be modified to include user-specific vocabulary. Larger products also carry thesaurus capabilities.

Examples: Grammatik, RightWriter

Applications: Use grammar and spelling checkers with word processors or DTPs that lack grammar or spelling checking.

1.3.21.2 Template

Templates (sometimes called style sheets) contain formatting and structure characteristics that may be applied to a text file. A template allows a user to define the look and structure of a document and to apply that same look and structure to other documents. Many word processors and DTPs include templates and template creation functions, but templates may also be purchased separately for use with a word processor or DTP.

Examples: PFS: First Publisher Business Templates, DocTemplates

Applications: Use templates on projects that need to produce multiple documents with a uniform format and structure, e.g. projects that produce documents to comply with DoD-STD-2167A.

1.3.21.3 Fonts

Fonts are characters of a specific style; they are recognized by documentation products and printers to display or print characters in a variety of styles, faces, and sizes. The different approaches to the use of fonts in documentation tools results in several font implementations, such as resident fonts that are a built-in printer feature or bit-mapped soft fonts and scalable soft fonts that are available on disks and cartridges (these are defined in the glossary).

Examples: PostScript Cartridge for LaserJet III, Softype

Applications: Bold and italic fonts can be used to emphasize the main points of a document. Larger fonts are useful with presentation products. Some fonts are more legible when faxed than are others. Smaller fonts can be useful for including more information in table cells.

1.3.21.4 Clip Art

Clip art is a collection of graphics stored electronically which may be cut and pasted electronically into a document. Clip art is included in some word processors and DTPs.

Examples: Animator Clips, Wheeler Clip Art

Applications: Clip art may be used on document covers, briefing charts, and anywhere the graphics communicate the author's message.

1.3.22 Workflow

Products that provide means for electronically implementing project workflow but do not provide extensive text manipulation like the Workgroup products. Such means include a user interface, access to the devices that process documents (fax, scanner, etc.), creation of folders, and routing of folders and documents that may have suspense times associated with them.

Examples: Lotus Notes, Rapport

Applications: May be used to implement software maintenance procedures including electronic distribution and review. Such implementation may automate parts of the procedures.

1.3.23 Workgroup (Groupware)

The Workgroup subdomain includes products with text manipulation features that run on a local area network and that emphasize the seamless sharing of text and graphics data among project members. These products provide access to databases, spreadsheets, text files, graphics, forms, and provide e-mail capabilities.

Examples: Asterix

Applications: Use Workgroup products for document creation, electronically distributing and reviewing software documentation, and for conferencing.

1.4 The Documentation Development Process

As with the software itself, documentation has a development process. The documentation process that produced a document is reflected in the quality of the document. If the process is well defined and well understood, the documentation quality tends to be higher than if the process is nebulous.

Process implementation has many benefits, the greatest of which is that predictable high-quality output is consistently produced. This consistency is made possible because cooperative relationships are established, proper feedback mechanisms are in place to monitor the process, unnecessary and time-consuming rechecking is eliminated, and work activities are well defined. [Barker 91]

While each organization's documentation process will be different, there should be some common denominators to a successful process. Those common denominators are described here as adapted from "Developing Effective User Documentation: a Human Factors Approach" [Simpson 85].

1.4.1 Define the Team

A team must be assembled that is capable of performing the documentation tasks. The team may include a contractor and contracting agency, since they may select the documentation types. Besides selecting documentation types, other tasks to be considered are managing, editing, writing, illustrating, page layout, and liaison between the technical expertise and the documentation team. Note that depending on the size of the effort, one or two people may perform all these functions or several persons may share any one of the tasks.

1.4.2 Select the Documentation Types

Selecting the documentation types consists of tailoring DoD-STD-2167A or DoD-STD-7935A (see section 4.4 of this report and also STSC SMG section 5.0) or in some other way deciding what documents need to be produced. A decision on which documents are needed is driven by the software's complexity, software users' requirements, the possible consequence of software errors, and project resources. For example, the operational software for a major weapon system involving nuclear safety issues will require some document types that will not be required for the graphical user interface for supply depot applications software.

1.4.3 Prepare Documentation Plans

The scope and content of each software document must be determined. The 2167A tailoring defines much of this including the content outline, depth and breadth. The plan also addresses the source of data, the use of graphics, and audience guidelines. The documentation plan is prepared by the managing and editing members of the documentation team with input from the writers who will be following the plan. The writers prepare the software documentation based on the document plan.

1.4.4 Develop Documentation Standards

Documentation standards apply to the structure and content of the documentation. DoD-STD-2167A provides such rules (though it is actually a software development standard and encompasses more than just documentation standards). The software development organization also needs documentation standards that address document format, readability, typography, and punctuation. Excellent style guides that cover these details are available commercially to complement standards such as DoD-STD-2167A and DoD-STD-7935A.

Documentation standards are a set of rules and examples that writers can follow in creating new documentation. [Simpson 85]

1.4.5 Develop Management Plan

This plan consists of the schedule (when) and the mechanics (how) of developing the documentation. A PERT or Gantt chart or both is developed to show when the various drafts are created and how the documentation schedule relates to the software development schedule. Some of the tasks that could appear on the schedule follow.

TASK	ASSIGNEE
write first draft	writer
create rough graphics	writer
internal review	writer and editor
create working draft	writer and editor
create working graphics	illustrator
technical review	technical liaison
create formal review draft	writer and editor
formal customer/user review	customer/user
produce final baseline document	writer and editor

Table 1-2. Develop Management Plan

The plan also outlines the facilities needed for document creation such as: documentation tools, technical support, working prototype of the software, access to classified information. The dependencies of the documentation schedule on this support is identified in the PERT or Gantt charts.

1.4.6 Create the Documentation

The mechanics of creating software documentation may mean keyboarding on a word processor or desktop publisher to create text and using a draw or flowchart package to generate graphics. More automated approaches involve the use of CASE tools that generate documentation based on user inputs. The user inputs specify the software development methodology (e.g. Shlaer-Mellor, Booch), software language (e.g. Ada, Cobol) and the desired format of the output file. The CASE tools provide data from a requirements/design repository that can be imported to a publishing product for final formatting as a document.

1.4.7 Conduct Technical Review

The technical liaison function coordinates this review with the creators of the software. The technical liaison is most effectively performed by a member of the group that creates the software since 1) they can answer some technical questions directly and 2) they have more influence with the analysts and programmers who create the software. The reviewers are formally notified of the amount of their time required to support the review and of the deadline for comment submission. Corrections based on the comments are made. This process may be repeated if needed until the document is technically complete and correct.

1.4.8 Conduct Customer/User Review

If the document is being developed to DoD-STD-2167A, the review of the document occurs in conjunction with the appropriate software review as outlined in MIL-STD-1521B. These reviews include the Preliminary Design Review (PDR), Critical Design Review (CDR) etc. The end user and independent validation and verification function, when appropriate, are able to make corrections through these reviews. Again note that reviews may be an iterative process that continue until the document is correct.

1.4.9 Create and Maintain Final Draft

The last step is the incorporation of comments and corrections. The document is then submitted to configuration management personnel and baselined. Any possible updates to the baselined document are submitted as change requests that must pass a formal change process. Updates may take the form of change pages or may be a complete new version of the document depending on the scope of the changes. The changes are provided to personnel appearing on a formally maintained distribution list. If the document is being published on CD-ROM, changes may be distributed as a new CD.

1.5 Capabilities of the Documentation Domain to Improve Software Development/Maintenance

Eighty percent of software errors in large real-time systems are requirements and design errors due to ambiguity, incompleteness, or faulty assumptions [Ramam 88]. The idea that better documentation can solve a big percentage of maintenance problems seems to be suggested by most [Rombach 87] but not all [Sneed 89] of the data. When process and modeling staffs do not document the reasons why they have reached certain conclusions this causes problems during the product life cycle. [Srivast 94]

From the early days of computing it has been recognized that some information other than the code is needed to maintain a program. [Arnold 93]

1.5.1 Capabilities of Software Documentation in General

A good documentation system has several important characteristics:

- It helps the developer uncover and understand the problem, and encourages the thinking process needed to solve the problem.
- It provides easy access to various levels of documentation, then quickly delivers proper information to the appropriate audience.
- It helps the maintainer by providing subject matter expert information and by demonstrating how the application satisfies requirements. [McCauley 92]

1.5.2 Capabilities of DoD-STD-2167A Documentation

The documentation as outlined by 2167A can provide visibility into the contractors' plans for developing software and performing configuration management (SDP) and for performing software formal qualification testing (STP). It can also show the technical progress of the project/system (SSS, SSDD, SRS, IRS, SDD, IDD) and prove that the software conforms to its requirements (STD, STR). It documents the software implementation (SPS) and the contents of the delivered software (VDD). It defines the required software support resources, plans the transition from development to support (CRISD), and provides materials that describe how to use and support the delivered software (SUM, CSOM, SPM, FSM). Finally, it supports evaluations of a software project's progress through the software development life cycle and helps demonstrate that the software will be maintainable after deployment. [CSDL 93]

1.5.3 Limitations of Documentation

Documentation has at least the following limitations: documentation requires resources to be produced and maintained, it may be inaccurate, it may not be read, it may not be understandable, and it may not be maintained [Arnold 93]. DoD-STD-2167A is being replaced by a new software development standard often referred to as MIL-STD-SDD which promises to address some of these limitations.

MIL-STD-SDD: 1) separates planning and engineering activities from preparation of deliverables to make it easier to call for one without the other, 2) permits the recording of project information in forms other than traditional documents, such as CASE tools, 3) permits the design of the as-built software to be described in code headers and comments, 4) provides guidance to prevent unnecessary deliverables. [Summary 92]

Because 2167A emphasizes documentation so heavily, the replacement of 2167A underscores the limitations of documentation. But the general philosophy of having a standard for development of software with associated documentation is defended by Frank Sisti of the SEI.

There are several routes to quality software. For example, DOD standards like the new military standard for software development and documentation are forcing people to turn out better software. [Sisti 93]

1.5.4 Capabilities of Documentation Tools

Documentation tools that focus on the publishing task (producing a document), provide a better looking document than was produced years ago using paper and tape. This is one reason that word processors and desktop publishers are so pervasive in the workplace.

Documentation tools that focus on the management of documents have the potential to further improve documents, and perhaps of more significance, have the potential to improve the process that produces documents. But two areas where current document management tools fall short of providing all the needed functionality are in 1) change control and in 2) linking changes in software documentation to the software. In a workgroup situation, a technical writer should receive an automatic electronic notification that changes have been made to critical files indicating a probable need for a documentation update. The change control shortfalls are listed in a recent article [Sorensen 94]. As with other tools, document management tools can be useful only to the extent that the process being automated is understood.

1.5.5 Summary

Software documentation is not the software any more than the owner's manual for your VCR is the VCR. It is easy to consider the documentation to be a "necessary evil". And sometimes the appropriateness of the word "necessary" is called into question. Is it really necessary or is it just "evil"? To minimize the work involved with documentation, alternate approaches have been considered; one of these is the *design record*. A design record is a collection of information proposed as an alternative to traditional documentation [Arnold 93]. The consideration of alternative approaches is commendable. But until a more automated way to capture the rationale for project decisions, the customer's requirements, the analyst's design, the reason for stuffing register A with "X", the baseline test sequence and configuration, and what button you push to *execute*, documentation will be part of the software development process.

2 RESERVED

3 PRODUCTS AND PRODUCT SELECTION

This section provides some general guidance for narrowing the search for specific documentation products. In doing so it introduces the reader to the STSC Product Lists, Product Sheets, Product Critiques, and Quantitative Tool Evaluations. We have narrowed the search as follows:

- Identify the documentation task.
- Decide if the task is "publishing" or "managing".
- Pick the appropriate subdomain(s).
- Use the subdomain long lists to generate a short list of products that meet the "must have" requirements (see Appendix B).
- Match the short list products' functionality to current and near future requirements (don't pay for functionality and complexity you don't need).
- Match each of the short list products with your organization's standards and architecture for information exchange.
- Stick with market leaders when possible; they are the most likely to be supported in the future and they are most likely to provide compatibility with other products.
- Know what you want, know your requirements, and know exactly what you want the tool to do. Ask the vendor a lot of questions; this is the only way to minimize any miscommunication that occurs between a vendor's marketing and technical groups.
- Get an evaluation copy of the product prior to committing. Reputable vendors are usually willing to work with potential customers in regards to evaluation of their products. The minimal costs involved in getting an evaluation copy far outweigh the costs of acquiring shelfware.

Final product selection is aided by the use of "STSC Quantitative Evaluations" of the foremost products. These evaluations are performed at the STSC for specific STSC customer's projects. The evaluations are based on questions in section 4 of *A Guide to the Classification and Assessment of Software Engineering Tools* [TECH REPORT].

3.1 Documentation Product Lists

Appendix B contains the lists of documentation products identified at the STSC at the time this report was published. The information gathered for each product includes:

- The product's name.
- Platforms/operating systems supported.
- Vendor name and phone number.
- Comments/classification for each product.

A list is provided for each subdomain. The capabilities of some products bridge two subdomains and will appear on two lists. Footnotes next to some product names point to additional information.

3.2 Product Sheets

Appendix C contains product sheets for the documentation products that the STSC has decided to include in this report. The product information sheets provide more in-depth information than the Product Lists to help customers make preliminary assessments about products. Various parameters are used to determine which products are included in the product information sheets in this report. These parameters include market share, vendor stability/maturity, applicability of subdomain to the software development arena, and the willingness of the vendor to provide the data. The Product Sheets are arranged alphabetically by tool name.

3.3 Product Critiques

Appendix D contains Product Critiques of a few documentation products. The Product Critiques highlight unique or noteworthy product capabilities and significant or annoying problems. The STSC is soliciting and publishing product critiques from experienced practitioners. Product customers can read opinions from experienced colleagues similar to the way friends ask each other for their opinions when buying a new car or some other expensive item or service.

Contact the STSC for any unpublished product critiques or updated product critiques that may be available.

4 STATE OF THE DOCUMENTATION DOMAIN

4.1 Summary of the State-of-the-Practice

The case studies in section 6 provide examples of the state-of-the-practice. The reader is invited to compare them to the hypothetical scenario in 4.2.

In general, software development organizations in the United States are at level 1 of the Software Engineering Institute's (SEI) Capability Maturity Model (CMM) [Koch 92]. The SEI CMM is a model that emphasizes the importance of understanding the software development process in an organization. These processes are being (but are not yet) defined. Documentation is generated/updated by analysts and technical writers keyboarding on word processors or desktop publishers. Some use of CASE tools has automated portions of the document publishing process. The structure of the software documentation generally follows an outline defined by a government standard. Document management, however, is largely a manual process. Many documents originate in an electronic form and are converted to hardcopy for review and distribution via hand delivery, mail or fax. Many documents are stored in desk or cabinet drawers as hardcopies.

4.2 Summary of the State-of-the-Art (a hypothetical scenario)

A hypothetical scenario of a Department of Defense software development project that has implemented existing technology available in the documentation domain follows.

4.2.1 Project Approach

Some of the delivered software was successfully reused from another program. This simplified the documentation effort considerably. A decision as to which types of documents (types as was discussed in section 1.4) were needed was made using a tailoring tool designed for projects following DoD-STD-2167A. A project management tool was used to generate PERT and Gantt charts depicting critical paths and task dependencies.

4.2.2 Overview of the Documents

The following types of documents were produced in this imaginary project: system specification, software requirements specification, software design document, user guide, and test cases. The detailed portions of the software design either referenced existing documentation

heavily or entire sections were copied from existing documents corresponding to the reused code. Unfortunately, much of this could only be imported to desktop publishing tools as straight ASCII text. Filter products were used in some cases to provide imported text with structure, tables and some graphics. Test documentation was minimal; a well documented and optimized software development process had detected most problems prior to coding.

4.2.3 Publication of the Software Requirements and Design

Most of the *new* content of the software requirements specification and software design document (*new* referring to the documentation corresponding to the code that was not reused) resided in an upper CASE tool repository. A robust desktop publishing product combined the repository data with document templates and methodology information to produce draft documents. The documents' format and structure were all provided automatically in conformance to project documentation standards. Paragraph numbering, references to tables and figures, table of contents, lists of figures and tables were generated automatically. Final formatting and review of the document is done via keyboard and mouse inputs to the desktop publisher.

4.2.4 Publication of User Guide

The publication of the user guide was simplified by the fact that the user interface to the system consisted of standard objects used on previous systems. Consequently, the characteristics of these objects were already documented. Modifications to the object descriptions were made via keyboard and mouse inputs to the desktop publisher. The actual procedures that involved user interaction with the objects as part of the system as a whole were developed under a separate effort and published as an interactive electronic technical manual (IETM - defined in the glossary) type of document. This effort required personnel with information mapping skills, and a hypermedia authoring tool to provide link and navigation features in the IETM.

4.2.5 The Publishing Process

The document publishing process is understood, documented and implemented using a leading workflow product. This product provides the project managers a real-time window on the status of each software document as it is created and reviewed as well as metrics to be used in improving the publishing process. Analysts, programmers, and managers exchange the documents electronically, however, hardcopies are used by some project members who prefer them to a screen display.

4.2.6 Document Management

Management of the project was simplified by the use of established document management procedures that include the use of documentation standards and configuration management procedures. Both contractor and government managers electronically accessed a common database that included schedule information as well as baselined software documents, meeting minutes and action items. Internal documents, which constitute corporate knowledge, have been electronically tagged, structured and stored. Information on corporate issues is retrieved using a search and retrieval system that was integrated and installed by an experienced systems integration organization.

4.2.7 Lessons Learned

A number of lessons were learned in this hypothetical project. Reuse was successful due to efforts on previous projects to provide standards, reuse training and a formalized reuse process. The project's documentation standards covering data formats, tools, templates and tagging were critical to a simplification of the documentation effort and to the feasibility of a common database. The database minimized duplication of effort by providing different views of data from a single instance of objects rather than requiring the manual generation of a document that provided that particular view. The database also facilitated configuration management.

4.3 Reserved

4.4 Standards

Standards provide substantially uniform and established reference points for documents, software, data formats and processes. They are basic to any of society's efforts that depend on interaction between numerous groups. Here we cover two topics: 1) DoD-STD-2167A because it is the DoD standard for developing software and addresses the documentation associated with that development, and 2) the CALS initiative because it focuses on more efficient ways of doing business including the management of the documents that are the lifeblood of business.

4.4.1 DoD-STD-2167A

DoD-STD-2167A is the Department of Defense Standard for Defense System Software Development. This standard establishes uniform requirements for software development that are applicable throughout the system life. The requirements of this standard provide the basis for Government insight into a contractor's software development, testing, and evaluation. An effort is underway to combine DoD-STD-7935A and DoD-STD-2167A [Guide 92]. Note that DoD-

STD-7935A is similar to 2167A but that while 2167A applies to mission critical computer resources (MCCR), 7935A applies to automated information software development (AIS projects). Information regarding the use of these standards is found in the STSC Software Management Guide.

MIL-STD-SDD is being developed to harmonize 2167A and 7935A through a paragraph-by-paragraph mapping of the two to identify common areas and differences and to resolve those differences in the context of MCCR and AIS projects. A second goal of MIL-STD-SDD, which will be known as MIL-STD-498 when complete, is to resolve issues raised in the use of 2167A and 7935A. The issues include those in Table 4-1. MIL-SDD-STD may be released in late 1994.

ISSUE	MIL-STD-SDD change
the implied waterfall model present in 2167A and 7935A	MIL-STD-SDD: 1) eliminates time-oriented dependencies and implications, 2) provides alternatives to formal reviews, and 3) adds figures, notes, and an appendix that tell how to apply the standard across multiple builds or iterations. [Summary 92]
the implied preference for functional decomposition	MIL-STD-SDD: 1) removes the requirement to partition the software into computer software components (CSCs) made up of computer software units (CSUs), 2) rewording DIDs to accommodate the expression of requirements and design in object-oriented and other ways. [Summary 92]
the emphasis on documents and the incompatibility with CASE tools	MIL-STD-SDD: 1) separates planning and engineering activities from preparation of deliverables to make it easier to call for one without the other, 2) permits the recording of project information in forms other than traditional documents, such as CASE tools, 3) permits the design of the as-built software to be described in code headers and comments, 4) provides guidance to prevent unnecessary deliverables. [Summary 92]

Table 4-1. DoD-STD-2167A Issues

4.4.1.1 Document Set Summary

DoD-STD-2167A contains Data Item Descriptions (DIDs) which describe the documents that accompany software development. The documents which the DoD-STD-2167A describes can be grouped into four categories:

TECHNICAL CATEGORY System/Segment Specification (SSS) System/Segment Design Document (SSDD) Software Requirements Specification (SRS) Interface Requirements Specification (IRS) Software Design Document (SDD) Interface Design Document (IDD) Software Product Specification (SPS)	SUPPORT CATEGORY Computer System Operator's Manual (CSOM) Software User's Manual (SUM) Firmware Support Manual (FSM) Version Description Document (VDD) Software Programmer's Manual (SPM)
MANAGEMENT CATEGORY Software Development Plan (SDP) ¹ Software Quality Program Plan (SQPP)	TEST CATEGORY Software Test Plan (STP) Software Test Report (STR) Software Test Description (STD)

Table 4-2. DoD-STD-2167A Documents by Category

4.4.1.2 Document Audience

The audience for each of the types of documents can be seen in Table 4-3:

¹Although not a 2167A document, this DOD-STD-2168 document fits well with the documents in this category.

	Technical	Management	Support	Test
Program Managers ²	X	X		X
Project Leaders		X		
Acquisition Officers		X		X
Contracts Personnel		X		X
QA Personnel	X	X	X	X
IV&V Personnel ³	X	X	X	X
Sub/Associate Contractors		X		
Support Personnel	X	X	X	X
Software Test Personnel	X			X
System/Software Analysts and Designers	X			
Maintenance Programmers	X		X	
Computer Operators			X	
CM Personnel/Librarian/Archivist			X	
Users	X		X	

Table 4-3. DoD-STD-2167A Documents' Audience

4.4.1.3 Evaluating DoD-STD-2167A Documents

Guidelines for evaluating 2167A documents have been developed in conjunction with the F-22 aircraft. The evaluation approach includes a specific guideline for each of the 17 DIDs associated with 2167A, with each guideline asking specific questions regarding each paragraph of the document under evaluation. Scores are determined based on the substantive content, understandability, consistency, traceability and correctness of the documents. The guidelines are available by contacting Capt. Joe Stanko(SM-ALC/LATE) at 916-643-0376.

² Program managers can be from both government and industry.

³ This also includes Independent IV&V (IIV&V) personnel.

4.4.2 CALS Standards Affecting the Domain

"Continuous Acquisition and Life-Cycle Support (CALS), established by DoD in 1985, is a DoD/Industry strategy for the transition to automated interchange of technical data and to the process improvements enabled by automation and integration," [Proceedings 91].

The CALS Software Product Committee (SPC) has developed a plan to "Apply the CALS strategy to the development, delivery, and maintenance of software products developed under DoD-STDs 2167A and 7935A," [Report 91]. The plan is a two phase approach. In the first phase, 2167A and 7935A are analyzed and Data Item Description/Document Type Definition (DID/DTD) packages are prepared. DTDs will permit a product to "Extract requirements, discern [the requirements] fit into the requirements hierarchy and understand [the requirements] relationships to design and test elements" [Report]. The second phase calls for a full database environment for software products consisting of the current software standards, their associated DIDs, and other related standards and specifications.

The preparation of DTDs that correspond to the 2167A DIDs is progressing under a government contract. The impact of MIL-SDD-STD on these DTDs is expected to be minimal. The determination regarding how these DTDs will be made available to government projects will probably have been reached by March 1994. Contact the STSC for this information.

For software developers and maintainers not familiar with CALS, getting an understanding of SGML and DTDs is a good place to start. This background will be useful as SGML continues to become more prevalent in the DoD and in the industry as a standard for encoding document text files and text databases.

The CALS standards that are related to the Documentation Technology Domain are described below. They include standards for the items in the Table 4-4.

delivery media	MIL-STD-1840A
delivery media	MIL-STD-1840B
3D vector	MIL-D-28000
ASCII text	MIL-M-28001A
raster	MIL-R-28002A
2D vector	MIL-D-28003
implementation	MIL-HDBK-59A
hypermedia	ISO 10744

Table 4-4. CALS Standards

4.4.2.1 Descriptions of CALS Standards

The following standards are available from the CALS/CE Information Center listed in Appendix F.

4.4.2.1.1 *MIL-STD-1840A: Delivery Media/Format/ Organization*

Sometimes referred to as the "parent" CALS standard, 1840A covers:

- a. *magnetic tape* - 1840A references Federal Information Processing Standard (FIPS) Pubs 1, 2, 25, 50, 79.
- b. *telecommunications* - Government Open Systems Interconnection Profile (GOSIP), FIPS Pub 146.

Header file requirements and data file types are covered here. Media other than magnetic tape (e.g. CD-ROM and ANSI X.12) are included in MIL-STD-1840B.

4.4.2.1.2 *MIL-D-28000: Initial Graphics Exchange Specification (IGES)*

This standard includes three dimensional technical illustrations and engineering drawings.

4.4.2.1.3 *MIL-M-28001A: Standard Generalized Markup Language (SGML)*

This standard is for the identification of textual (unfielded) data and defines the following:

- a. *tags* - embedded information specifying processing details of "sections" including references to raster and vector illustrations.

- b. *Document Type Definition (DTD)* - specifies the organization, structure and content of the document and the meaning of the tags.
- c. *Formatting Output Specification Instance (FOSI)* - specifies document format and style.
- d. *Page Description Language (PDL)* - specifies how the page is produced (e.g. PostScript).

4.4.2.1.4 *MIL-D-28002: Requirements for Raster Graphics Representation in Binary Format*

This standard includes Type I (untiled) and Type II (tiled). In plain English, this is just the format for a fax. "Tiled" refers to the logical cutting of a raster image into rectangular sections, an approach used for more efficient handling of images larger than 8.5 x 11" such as for facsimile transmission.

4.4.2.1.5 *MIL-D-28003: Computer Graphics Metafile (CGM)*

This standard includes two-dimensional technical illustrations and graphic art.

4.4.2.1.6 *MIL-HDBK-59A: DoD CALS Program Implementation Guide*

This guide assists weapon system acquisition managers to understand when, where, and how to apply CALS capabilities efficiently. The guide is to support weapon system acquisition managers' information interchange and access requirements for integration of the contractor process.

4.4.2.1.7 *Hypermedia/Time-Based Structuring Language (Hytime)*

This standard describes a language and syntax for representing objects, including hypermedia, in documents. Standardized linking, alignment, and addressing methods allows objects to be made available in a standardized way.

4.4.2.2 *Benefits*

The benefits of CALS to the software development process have been summed up by the Software Product Committee.

"To reduce the total cost and time attributed to documentation, and more importantly, to improve access to the information contained in the documents, it is essential that the CALS strategy be appropriately applied to software and its associated documentation products, i.e. to software products . . .

The successful completion of the guidelines for the Near Term solution contained in [the CALS ISG SPC Near Term Project] report will enable the development, delivery, and maintenance of software products on electronic media. This will enhance requirements traceability, facilitate data integrity throughout the life cycle of the system, and ensure that information contained in software products is readily accessible to support all processes in the life cycle. The quality of the products will be improved and the data cycle reduced. Implementation will facilitate the reuse of data within a system procurement and subsequent procurements It will also facilitate a smooth transition to the Long Term vision of CALS -- a fully integrated database environment" [Report 91].

5 THE SEI CMM AND DOCUMENT MANAGEMENT

Software development organizations are among those that can benefit from document management. As an organization moves through the Software Engineering Institute's (SEI) Capability Maturity Model (CMM), documents will need to be managed. Note that several types of documents are identified for the Key Process Areas in Level 2 organizations.

Key Process Area (KPA)	Types of documents identified
Requirements Management	2
Software Project Planning	7
Software Project Tracking and Oversight	5
Software Subcontract Management	9
Software Quality Assurance	6
Software Configuration Management	7
Total	36

Table 5-1. Types of CMM Level 2 Documents by KPA

These documents include *plans* for:

- quality assurance,
- configuration management,
- development and revision of software,

as well as *procedures* for:

- change requests,
- project tracking,
- subcontractor selection,
- reviews and
- audits.

Twenty-three additional document types are identified for Level 3, seven additional for Level 4 and fourteen additional for Level 5 (reference Appendix J). It is unlikely, however, that a single project would require all of these types of documents.

Level 5 organizations are characterized by feedback mechanisms to monitor and improve the system. The organizational history is the yardstick for determining improvement. That history must be captured in documents or some other form. These records, documents or whatever will contain the lessons learned, the errors made, the things that worked. An organization that can quickly recall these lessons may be able to avoid the mistakes of the past and similarly duplicate the successes.

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6 CASE STUDIES

Case studies provide the reader an opportunity to learn from the success and failures of others in their various approaches to the documentation problem. Four such case studies follow. The first case study describes documentation on a project after the tools have been selected. The second and third case studies describe the tool selection process, though the third also covers some project issues related to using object-oriented analysis and DoD-STD-2167A. The last case study describes an integration approach that closely couples documentation tools with other CASE tools in a test environment.

6.1 Documenting Thiokol Resource Planning Software

6.1.1 Project Overview

Thiokol Space Operations in Utah has been using an IBM MRP II (Manufacturing Resource Planning) software product called COPICS/E to manage resources at a rocket booster manufacturing facility since late 1992. Using a commercial-off-the-shelf (COTS) product was attractive from a cost standpoint when compared with the cost of developing the software from scratch because of the lower acquisition and maintenance costs. But some software development was still necessary to modify and expand COPICS/E functionality and to integrate it with existing software. The additional software was implemented in Cobol; the COPICS/E source code (Cobol) was also modified. This additional software was documented as follows.

6.1.2 Overview of Documentation

The software documents were small (from 5 to 120 pages) though the total combined page count was thousands of pages. Documentation generated consists of requirements documents, design documents, database design specifications, training materials, and users manuals. While not DoD-STD-2167A documents, these were done to Thiokol internal standards to produce structured documents.

6.1.3 Document Publishing

Systems analysts generated draft requirements documents using a word processor (WordPerfect 5.1 running on MS-DOS). The drafts were reviewed first by other project team members (systems analysts and users), second by the programmers who will use the document, and last by the program office. The originating systems analyst incorporated the reviewers'

comments on WordPerfect as needed. Final documents were then assigned a control number for future reference and placed in the control library.

Design documents were handled differently in that they were generated using the Bachman CASE tool (Information Builders/Massachusetts). Inputs to the tool included dataflow, process flow and database design information. The Bachman tool generated a design document composed of data in tabular and flowchart formats. A couple of additional pages were sometimes generated manually on WordPerfect to augment the Bachman output. The possibility of generating code automatically from the Bachman output is being considered.

User Manuals were drafted in WordPerfect and were then imported into a page layout tool (PageMaker). Bitmap screen captures were also imported into PageMaker. The manuals augmented the existing COTS documentation and were written to communicate specific Thiokol procedures for using the tool to do a specific job. Superfluous COTS functionality that was not needed to do the job was not addressed in the manual. A subject matter expert provided the manual's basic content and then a technical writer addressed grammar, language, format and some limited content.

6.1.4 Document Management

The control library maintained hard and soft copies of all baselined documents. Control numbers and revision numbers were assigned. The library was maintained in a secure location with the librarian having sole access to the documents. A spreadsheet was used to track documents. While some consideration was given to getting a document management system for the project, those considerations fell prey to time and money considerations.

6.1.5 Lessons Learned

The experience gained during this project yielded several discoveries:

- A spreadsheet was not capable of effectively showing the relationships between the documents in the control library. A document management system was needed to do this. When software updates were needed, the relationships were identified manually. A document management system would simplify the documentation update process.
- Producing documents to a style guide and using a formal review process took more time than less formal internal approaches used previously. But the documents were of higher quality

- WordPerfect and PageMaker were appropriate tools for producing the documentation. These tools were inexpensive and provided functionality compatible with the length and complexity of the documents produced. However, due to WordPerfect's wider use in the Thiokol facility consideration is being given to dropping PageMaker.

6.2 Case Study - Selecting a Documentation Tool

In early 1991, a classified software development project needed tools that provided word processing, presentation graphics, spreadsheet, and database management functions with data interchange between these functions. The tools needed to support floppy disks and existing printers and be compatible with SparcStation/Sun OS, UNIX, MIT X, and OSF/Motif. The tools also needed to operate with the existing software infrastructure.

6.2.1 Candidate Tools

The following candidate tools were identified as having the potential to meet some portion of the requirements:

Integrated Office Automation	Uniplex II+ Asterix Slate SAS System Island Series Q-Office+	Quintet Rapport Convenience Office Power SmartWareII Enable	
Desktop Publisher	FrameMaker Interleaf		
Word Processor	Crystal Writer WordPerfect		
Spreadsheet	eXclaim Wingz Lotus1-2-3		
Presentation Graphics	Autograph Graftsman		
Database Management	Informix Ingres Oracle	Unify dBaseIV Foxbase+	Sybase

6.2.2 Tool Characteristics

The following tool characteristics were important to the project. The italics indicate higher priority characteristics.

Word Processor	Presentation Graphics	Spreadsheet	Database Management
<i>Center</i>	<i>Generate Graphs</i>	<i>3D</i>	<i>Relational Database</i>
<i>Underline</i>	<i>Generate Charts</i>	<i>Linked 2D</i>	<i>SQL Query</i>
<i>Bold</i>	<i>Text</i>	<i>Macros</i>	<i>Report Generation</i>
<i>Italicize</i>	<i>Drawing</i>	<i>Presentation Quality Reports</i>	<i>Screen Generation</i>
<i>Block and Move</i>	<i>Bar, Pie, & X-Y</i>	<i>Presentation Quality Graphic</i>	<i>Local Store and Analyze Data</i>
<i>Page Layout</i>	<i>Save to Floppy</i>	<i>Flexible Cell/Block Format</i>	<i>Record Locking (during update)</i>
<i>Spell Check</i>	<i>Print</i>	<i>Alphabetic Sort</i>	<i>Record Update</i>
<i>Search</i>	<i>Interchange Data</i>	<i>Numeric Sort</i>	<i>Record Insert</i>
<i>Global Change</i>	<i>Symbol Libraries</i>	<i>Insert/Delete Rows/Columns</i>	<i>Record index Multi-field</i>
<i>Print</i>	<i>Organizational Aids</i>	<i>Save to Floppy</i>	<i>Save to Floppy</i>
<i>Save to Floppy</i>		<i>Print</i>	<i>Print</i>
<i>Interchange Data</i>		<i>Import/Export Data</i>	<i>Import/Export Data</i>
<i>Block Copy/Delete</i>		<i>Lock Rows/Columns</i>	
<i>Hyphenation</i>		<i>Formulas/Functions</i>	
<i>Sorting</i>			
<i>Auto-Footer</i>			
<i>Header/Trailer</i>			
<i>Table of Contents</i>			

Table 6-1. Criteria for Tool Selection at Classified Project

Table 6-1. Criteria for Tool Selection at Classified Project

It was determined that an integrated product that provided word processing, graphics, a spreadsheet and a database was advantageous over a multi-product approach. An integrated product includes built-in data sharing formats, a common user interface, a single source of maintenance and training and sharing of administration overhead across the integrated functions. These advantages were weighed heavily in selecting three products for detailed evaluation.

6.2.3 Evaluation and Conclusion

Evaluation copies of Uniplex II+, Asterix, and Slate were installed and tested.

Although Uniplex provided all four functional applications it was more difficult to learn and use. Asterix was selected based on the strength of its GUI, fully integrated functions, import/export capabilities, on-line tutorials and help, documentation and print capabilities. Asterix has no database management system so integration with the database was done using the cut and paste, import/export and the Extended Language Facility (ELF).

After eighteen months of use on the project, Asterix has proved to be a good choice though some improvements could be made (see Product Critique).

6.3 Case Study - USSTRATCOM Intelligence Software Development

In early 1993, the STSC and a software development organization at USSTRATCOM began a technology insertion project to pilot the use of object-oriented analysis and design in the development of intelligence software. The analysis and design tool selected was CADRE's Teamwork. A documentation tool was selected to simplify the generation of documentation based on data in the Teamwork repository.

6.3.1 Background

The pilot project used DoD-STD-2167A as the standard for developing the software, since 2167A is the Air Force and Department of Defense standard. The software was to be implemented in Ada, the standard language for defense software. An object-oriented analysis and design approach was desired; specifically the Shlaer-Mellor method was selected. To demonstrate success in the form of working code earlier in the project, the effort used incremental development. "Incremental" means that a portion of the requirements was identified

to be designed and implemented, followed by subsequent design and implementation of other portions of the requirements until all requirements were implemented.

DoD-STD-2167A was not intended to be specific to a single methodology. It was tailorable to fit different projects. Nevertheless, an implied waterfall model was present in the standard. The waterfall model treated the system requirements as a whole, with formal reviews and documents occurring between phases of development. Baselines were to be established at the end of each phase to strictly control the documentation and software. The incremental approach of the pilot did not fit the waterfall model because it treated portions of the requirements rather than the whole.

6.3.2 Documentation Tool Selection

The major considerations for selecting a documentation tool included:

- compatibility with Teamwork
- compatibility with the existing documentation tool used throughout the organization
(*Asterix*)
- compliance with the DODIIS (Department of Defense Intelligence Information System) standards
- training availability
- vendor stability
- ease of use

Compatibility with Teamwork referred to the ability of the documentation tool to incorporate the Teamwork analysis and design information into DoD-STD-2167A documents with minimum manual effort. A third party product (*DocExpress*) was available for mapping and placing Teamwork objects into deliverable documents. *DocExpress* performed this mapping for two desktop publishing products: Interleaf Inc's *Interleaf 5* and Frame Technology Inc's *FrameMaker 4.0*. No commercial-off-the-shelf (COTS) product to map analysis and design information into *Asterix* was available.

Asterix included filters to import both *FrameMaker* and *Interleaf 5* documents. Evaluation copies of *DocExpress*, *Interleaf 5* and *FrameMaker* were installed with Teamwork and were used to generate test documents. While the *Asterix* filters imported text successfully, graphics were another story. Processing crashed when an *Interleaf* graphic or table was encountered. *FrameMaker* tables and graphics were skipped, subsequent text was imported but the 2167A formatting provided by *DocExpress* was lost.

Eventually, Interleaf 5 was selected because of its greater functionality. Part of the greater functionality included the SGML authoring and DTD generation options. The DODIIS specified SGML as one of the standards to be used by the intelligence community.

6.3.3 Object-Oriented Analysis and 2167A

DoD-STD-2167A was developed before the concept of reusing major portions of software was known. The Shlaer-Mellor approach is an object-oriented approach based on such reuse. Shlaer-Mellor includes the use of domain analysis, but 2167A makes no specific provision for documenting the domain analysis portion of the Shlaer-Mellor analysis. Notably, neither DISA nor STARS who advocate large scale reuse have a clean solution for documenting software architectures using 2167A.

For the insertion project, the decision was made to document the object-oriented analysis in the Software Requirements Specification (SRS). This required that the SRS be tailored to cover a software system and to specify that the following would be included in the SRS: Shlaer-Mellor domain chart, bridge descriptions, requirements traceability, information model, state model and process model.

Another problem encountered was that the Software Requirements Specification (SRS), Interface Requirements Specification (IRS), Software Design Document (SDD), and Interface Design Document (IDD), which are DoD-STD-2167A documents, did not map cleanly to the Shlaer-Mellor approach. These 2167A documents were not useful to a reader without an understanding of the Shlaer-Mellor methodology and were of questionable value even if the reader did have the SM background. This was mitigated by combining the SRS and IRS into a single document and by similarly combining the SDD and IDD.

6.4 F-16 Avionics Software Support

6.4.1 Project Overview

The F-16 C/D COMmon Modular EnvironmenT, or COMET, is an avionics software support architecture. COMET was created to provide a software development and maintenance environment for the operational flight programs of the C and D models of the F-16 fighter aircraft. This environment supports the following phases of the operational flight program engineering process:

- software development
- computer program test and evaluation
- engineering readiness testing
- integration testing

The system allows the user to integrate and test changes in five major subsystems prior to flight test. Maintenance is simplified because of the commonality of components across the COMET architecture. The general purpose modules are also reusable and transportable so that new test facilities can be built easily and inexpensively. They can also be easily replaced as new technology becomes available.

Integrating documentation tools with other tools provided the test stand developer with a system that handled documentation in addition to the editing, debugging, compilation, and configuration management functions.

6.4.2 Overview of Documentation

The documentation was not strictly compliant with, but borrowed heavily from DoD-STD-2167A. The main documents were called Software Documents (SWD) and included elements of the analysis, design and user documents in 2167A. The SWD were living documents and were updated as code was developed and modified. Eventually links in the documentation will allow the reader to jump to the source code corresponding to the document section being displayed.

The thirty or so anticipated SWD's will generally correspond to the different Computer Software Configuration Item (CSCI) sections of the system specification. The documents are ten to fifteen pages in length and will be linked together so that the developer can easily reference the different files.

6.4.3 The Documentation Process

The developers of the environment used two commercially available modeling products, Software through Pictures (STP) and OMTool, to help in their analysis and design of the environment tools. The drawings from STP and OMTool were integrated into the SWDs for each of the CSCIs. The Software Documents were developed using the FrameMaker desktop publishing system. The SWD for each of the environment tools and processes were tailored to three different specifications: 1) an object-oriented specification developed by the project members, 2) DoD-STD-2167A CSCI and 3) DoD-STD-2167A CSC. The environment developers used the specification that fit each environment tool best.

6.4.4 Configuration Management

Configuration management of the COMET source code was accomplished with the Source Code Control System (SCCS). However the SCCS did not provide control over all the COMET components including documentation, hardware source and mechanical drawings. So in

the second quarter of 1994, SCCS will be replaced by Atria's ClearCase. ClearCase will allow the COMET developers to provide a completely configured baseline with software source, documentation, hardware source and mechanical drawings.

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7 DOMAIN TRENDS

Documentation Domain trends are driven by the need to share and manage text and graphic data. Manifestations of the need to share data include: 1) the existence of the Filter/Translator subdomain, 2) the electronic mail and networking features of the Workgroup subdomain, and 3) the Electronic Distribution subdomain. Manifestations of the need to manage the data include: 1) increased press coverage of document management issues and 2) appearance of more products for managing documents.

7.1 Electronic Display and Distribution

Part of document management includes being able to accurately display documents' format. This means that the displayed fonts, margins, graphics, tables and so forth look the same as when printed. The accurate display of documents content and format across multiple platforms makes electronic distribution practical. Products that attempt to meet this need are Acrobat, Common Ground, WorldView and SGML-based products which all provide platform independent display of documents. The SGML approach is highly structured and requires expertise with DTDs while Acrobat, Common Ground, and WorldView do not.

7.2 SGML

ASCII provides a platform independent character representation; in a similar sense, SGML (as stated in 4.4.2 and the glossary) provides a markup language that is platform-independent. While SGML is hardly a household acronym, it continues to move away from obscurity into the mainstream. As SGML's popularity grows, we see more SGML tools and capabilities being offered. As SGML comes of age it may provide a standard for object tagging that will facilitate the documenting of software by retrieving objects such as paragraphs and graphics from a database.

7.3 Openness and Ease of Use

Vendor alliances are common; few vendors produce a documentation product that runs on their proprietary hardware alone. Increasingly, vendors appeal to customers by giving them as many options for compatibility and uniformity as possible. Some vendors of desktop

publishers and word processors publish catalogs of third-party products that provide more capability to the user. The results of such cooperation can be add-on products such as grammar and spelling checkers, filters, and document managers.

Managers of software development projects that anticipate using CASE products need to be aware of the trend by the vendors of CASE products to couple closely with the more robust members of the DTP domain. This close coupling means greater compatibility of the documentation product with other products used on the project. While a project may not need all the functionality of these higher end documentation products, the advantages of a more fully integrated solution often justify the high end product. "High-end product" in this context refers to the desktop publishers that include the functionality to produce highly structured and lengthy documents via a graphical user interface and that also provide displays to faithfully represent the printed document.

While the trend is away from the proprietary to the open, too often the only standard for transfer of text between documentation products is ASCII. ASCII allows the transfer of the document content captured in the character strings. If the Documentation Domain were completely open, documents, as a rule, could be transferred complete with fonts, headers, footers, paragraph structure, and tagging information.

The proliferation of Microsoft Windows products and the development of the Motif graphical user interface (GUI) are manifestations of the demand for openness, compatibility and ease of use. While these trends may eventually bring us back full circle to a dependence on one or two vendors (with Microsoft becoming the IBM of the future), for now these trends encourage more effective use of documentation products.

In many subdomains, ease of use is receiving increasing emphasis as the leading documentation products in these subdomains reach functional parity. This is not an unexpected observation in a mature technology domain. Ease of use as an issue extends beyond just the functionality of the product; it includes the quality of the user documentation and the technical support. These are becoming more important in differentiating between products that may be functionally very similar. Some vendors offer multiple products with varying degrees of complexity and functionality, recognizing that users want ease of use consistent with the functionality they require. Less functional products tend to require less money to purchase and less time to learn.

7.4 Vendor/Product Stability

The market in the document management area of the Documentation Domain is volatile. Although more stability might be expected in the more mature publishing area of the Documentation Domain, the market for documentation products focused on publishing is also volatile. It is a challenging task for vendors to field, market and support profitable software. The competition is fierce; market niches change and new technologies challenge older technologies. In such an environment, the inevitable toll is taken. We have seen Wang and Mentor Graphics make readjustments that have included the demise of some documentation products [Sorensen 92]. In this market, users may find themselves with a documentation product that is no longer supported.

Managers who select leading documentation products for their projects help minimize the impact of the marketplace dynamics on those projects in two ways. First, selecting documentation products with a large market share helps decrease (but not eliminate) the possibility of being in the unenviable position of having no vendor support. Second, when vendor support for a leading product is dropped, the options for migration to an alternate product should be greater than would be the options for an obscure product.

7.5 Hypermedia and Hypertext

Hypermedia is an extension of the idea of hypertext that incorporates other components such as video, illustrations, diagrams, voice and animation, and computer graphics. Information mapping is a way to analyze, organize, write, sequence, and format information [Horn 89] for use in hypermedia and hypertext.

Information mapping is evolving into a new technical job description. The design of documents for online use includes specifying the font, framing and size for the data. The goal is to make the information more readable and presentable on screen. [Meyer 92]

Hypermedia is being used in the Department of Defense for technical manuals. Because a variety of media such as sound and video can be used in a single workstation or laptop computer, hypermedia is being used for instructional documents like user manuals. Hypertext on the other hand is useful in a maintenance setting for helping someone navigate through a lot of text to focus on the specific information to fix a problem in a complex system.

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Appendix A:
Introduction to the STSC

1 Introduction

This report was written to help Air Force Software Development and Support Activities (SDSAs)¹ identify and evaluate technologies that could potentially improve their ability to document software.

1.1 The Software Technology Support Center

The mission of the Software Technology Support Center (STSC) is to transition technologies and exchange information to help DoD Software Development and Support Activities continuously improve their software quality and life cycle productivity.

A planned approach is necessary for successful transition. In general, transitioning effective practices, processes, and technologies consists of a series of activities or events that occur between the time a person encounters a new idea and the daily use of that idea. Conner and Patterson's Adoption Curve [Conner 82], shown in Figure A-1, illustrates these activities.

After encountering a new process or technology, potential customers of that technology increase their awareness of its usage, maturity, and application. If the process or technology is promising, then customers try to better understand its strengths, weaknesses, costs, and applications. These first activities in the Adoption Curve take a significant amount of time.

Next, the customer evaluates and compares the processes and technologies that show the most promise. To reduce the risk, customers usually try new processes or technologies on a limited scale through beta tests, case studies, or pilot projects. A customer then adopts processes or technologies that prove effective. Finally, refined

¹A Software Development and Support Activity is a DoD or Military Service organization responsible for the software development and/or support of a designated Mission-Critical Computer Resource (MCCR). Adaptation based on "Mission-Critical Computer Resources Software Support," *Military Handbook 347*, Department of Defense, p. 10 (May 1990).

processes and technologies become essential parts of an organization's daily process (institutionalization).

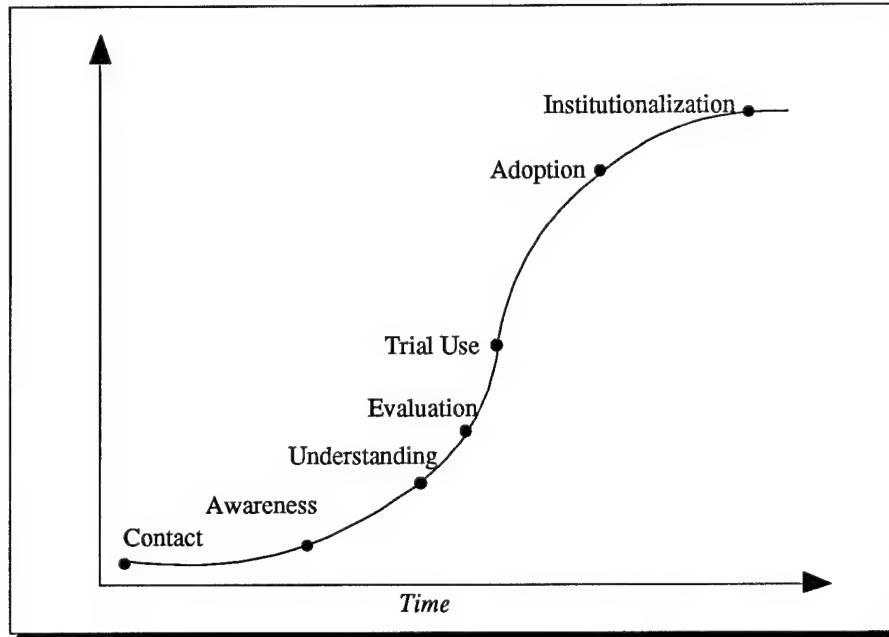


Figure A-1. Adoption Curve

Word processors are essential in most organization's daily operations. Yet, thirty years ago they did not exist. The institutionalization of word processors in many organizations followed a series of events similar to those identified in the Adoption Curve.

The STSC is researching and collecting information about technologies that will reduce the time and resources it takes to become aware, understand, evaluate, test, try, and adopt effective practices, processes, and technologies. The STSC has developed the following objectives to accomplish its mission:

- **Technology Evaluation**
Identify, validate, classify, and evaluate effective processes and technologies.
- **Information Exchange**
Facilitate the exchange of better software business practices, processes, and technologies within the DoD.

- **Insertion Projects**
Analyze and improve processes, adopt new methodologies as needed, evaluate and select effective tools, receive appropriate levels of training, and perform pilot projects to try out and confirm the technology insertion efforts.
- **STSC Associates**
Develop STSC Associates who can infuse effective process and technology improvements through the use of STSC products, services, and processes.

1.2 STSC Technology Transition Approach

This section describes the STSC's approach to meeting the objectives identified in the previous section.

1.2.1 Technology Evaluation

The first technology transition objective involves identifying, validating, and classifying processes, methods, and technologies that can potentially improve the quality or productivity of software development and maintenance. Many organizations are so focused on deadlines and customer needs that they lack the resources and time to thoroughly investigate options for improvement, leaving them vulnerable to marketing hype. The STSC has developed the infrastructure to provide information on all types of applicable technologies. Product critiques, which are essentially brief evaluations from experienced technology users, are collected. Quantitative evaluations, which are detailed, comparable, and objective, are performed on the most promising tools, methods, or processes.

1.2.2 Information Exchange

This technology transition objective involves exposing potential customers to available technologies and, conversely, customer requirements to technology developers. Referring to the Adoption Curve, this objective focuses on contact, awareness, and understanding. STSC products that accomplish this objective include *CrossTalk* (a monthly technology report), the annual Software Technology Conference, specific technology reports, and electronic customer services.

1.2.2.1 *CROSSTALK*

Over 11,000 software professionals receive *CROSSTALK* monthly. This publication provides a forum for the exchange of ideas. Articles cover leading edge, state-of-the-art, and state-of-the-practice processes and technologies in software engineering.

1.2.2.2 *Software Technology Conference*

The annual Software Technology Conference is held each April in Salt Lake City, Utah. This conference brings together approximately 2,000 software professionals from government, industry, and academia to share technology solutions and exchange ideas and information.

1.2.2.3 *Technology Reports*

STSC technology reports provide detailed information on specific software engineering technologies; and this report is an example. The current list of reports include:

- Test Preparation, Execution, and Evaluation [TPEE]
- Documentation [DOC 93]
- Project Management [PM 92]
- Requirements Analysis and Design [RAD 92]
- Reengineering [RE 92]
- Source Code Static Analysis [SCSA 92]
- Software Engineering Environments [SEE 92]

These reports provide awareness and understanding of each topic in preparation for evaluation and selection of corresponding technologies. Over 40,000 of these reports have been distributed.

1.2.2.4 *Electronic Customer Services*

Along with the services mentioned above, the STSC also provides customers with electronic access to information via Electronic Customer Services (ECS). ECS includes a bulletin board system that is available to obtain additional information, leave messages, add information, and confer electronically. In addition, a computerized database of practice, process, and technology information is coming on-line. ECS can be accessed via the INTERNET at address 137.241.33.1 or stscbbs.af.mil or by calling 801-774-6509 with modem at 2400 or 9600 baud, 8 bit word, 1 stop bit, and no parity.

1.2.3 *Technology Insertion Projects*

STSC technology insertion projects are customer oriented projects that evaluate, select, and pilot the use of new processes, methods, and technologies for a specific customer. These projects can include process definition, process improvement, methodology insertion, tool insertion, and development of a technology road map. Referring to the Adoption Curve, Figure A-1, an insertion project helps cement understanding of a process or technology, tailors an evaluation of the process or technology for the customer, and pilots the use of that process or technology with appropriate levels of training. Customers move closer to adoption of the process or technology through hands-on experience. It is important to try out technology improvements in a pilot project to confirm that the technology is appropriate for the organization and that the organization is ready and able to adopt the new technology.

1.2.4 *STSC Associates*

Fowler and Przybylinski [Fowler 88] propose that transitioning new technologies from a developer to a consumer requires an advocate to push the technology and a receptor to pull the technology into an organization. This concept is illustrated in Figure A-2.

Effective change comes from within the organization. The STSC Associates objective is to develop technology receptors within individual Air Force SDSAs. These receptors, STSC Associates, are trained in the use of the STSC's information, products, and services to enhance their organization's ability to incorporate advanced practices, processes, and technologies.

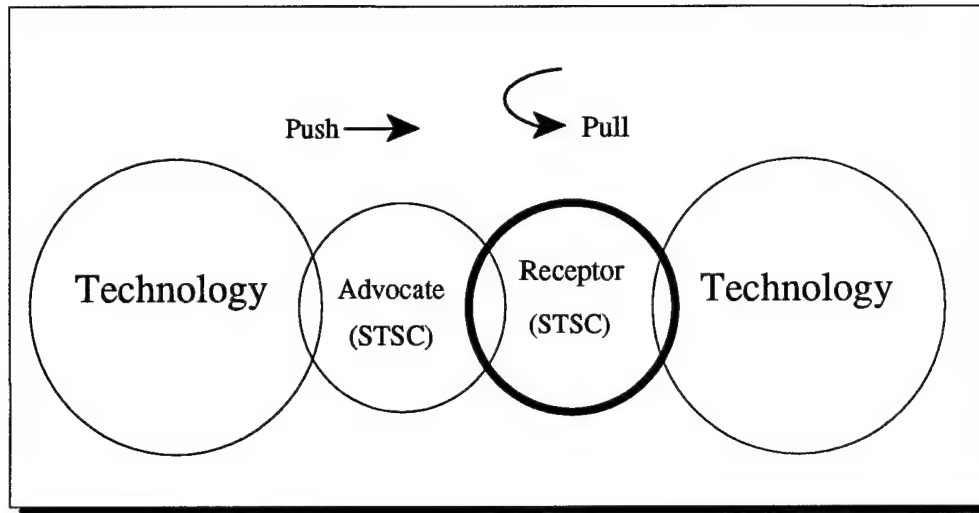


Figure A-2. Transitioning Technology

Referring to the Adoption Curve in Figure A-1, STSC Associates complete the trek to institutionalization. Associates coming from within the organization should be politically astute and aware of internal organizational requirements. They have the highest probability of influencing the adoption and daily use of effective business practices, processes, and technologies.

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Appendix B:

Documentation Product Lists

Any price information is suggested manufacturer retail pricing. Price ranges vary as they are commensurate with user requirements. Quantity and government discounts are often available. Please contact vendor for specific pricing.

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Clip Art List

Tool	Platform	Vendor	Comments/Classification
DrawPerfect Holiday and Business Packs	MS-DOS	WordPerfect Corp. 800-451-5151	Clip art \$79
Federal Clip Art 1	UNIX, VMS	Fusion Graphics 805-494-8411	General federal insignia. Single node \$599
Federal Clip Art 2	UNIX, VMS	Fusion Graphics 805-494-8411	Includes Air Force aircraft insignia, rank, missiles, rockets, patches of major commands, NASA, etc. Single node \$599
Federal Clip Art 3	UNIX, VMS	Fusion Graphics 805-494-8411	Naval insignia. Single node \$599
Federal Clip Art 4	UNIX, VMS	Fusion Graphics 805-494-8411	Combat insignia. Single node \$599
Federal Clip Art 5	UNIX, VMS	Fusion Graphics 805-494-8411	Army insignia. Single node \$599
Freedom of Press	UNIX, Mac, Windows, MS-DOS	Color Age Inc. 800-4-FREEDOM	Fonts and clip art for non-PostScript printers. \$1495.
Fresh Art	MS-DOS, Mac	Quanta Press Inc. 612-379-3956	Original clip art that won't be seen anywhere else (1000-1500 bw/color) \$100
Publique Art	MS-DOS, Mac	Quanta Press Inc. 612-379-3956	Clip Art (abt 1500 bw/color) \$100
Seals of the US Federal Gov't	MS-DOS	Quanta Press Inc. 612-379-3956	Clip art (588 seals - 300 dpi) \$80

Color Publishing List

Tool	Platform	Vendor	Comments/Classification
Animator Pro	MS-DOS	Autodesk Inc. 800-879-4233	Presentation & animation \$795
Colorit 2.0	Mac	MicroFrontier 515-270-8109	Color image processing printing \$149
Alias Eclipse	Silicon Graphics	Alias 203-270-9622	File conversion & connectivity to all major industry file formats, image editing for graphic design. Price: \$5,995.
Alias Separator	Silicon Graphics	Alias 203-270-9622	Provides RGB-to-CMYK conversion with advanced tools to help refine image separations for print. Price \$3,995

Database Publishing List

Tool	Platform	Vendor	Comments/Classification
askSam	MS-DOS, Windows	askSam Systems 800-800-1997	Document database; converts text to a format retrievable by query \$395 (standalone, \$1095 five user network)
BASISplus	MS-DOS, UNIX, VM, MVS, VMS, IBM Mainframe, HP	Information Dimensions 614-761-7311	Full-text document storage, retrieval and management; supports large document collections and textual information databases. Price: (Complete with BasisDesktop) Beginning at \$10,000 to \$200,000.
DBL Synergy Information Control Sys.	MS-DOS, UNIX, VMS, RS6000	DISC 800-DBL-DISC	Allows access to many file types without programming; supports DBL, ISAM, C-ISAM, Btrieve, Oracle, ASCII, Lotus 123, dBase. \$500 - \$3000
DBL Synergy Report Writer	MS-DOS, UNIX, VMS	DISC 800-DBL-DISC	Interactive columnar report writer for access to many file types; supports DBL, ISAM, Btrieve, Oracle, ASCII, DIF, SDF, Lotus 123. \$500 MS-DOS, \$1000 UNIX, \$1500 VMS.
dbPublisher for Ventura	MS-DOS	Step Two Software 800-527-2506	Desktop publisher similar to dbPublisher-Professional but designed specifically to enhance Ventura Publisher. \$199
dbPublisher-Pro Plus	MS-DOS	Step Two Software 800-527-2506	Desktop publisher specializing in hot links to dBASE, R:BASE, Paradox, FoxBASE, Lotus 1-2-3, WordPerfect, Word. \$495
Document Director	MS-DOS	Bruce G. Jackson & Associates 713-486-7817	Requirements traceability, text editor, database \$4950
INQUIRE/Text	IBM mainframes (MVS, VM)	Infodata Systems Inc. 703-934-5205	Text database management. \$110,000 to \$250,000.
Intelligent Query (IQ)	MS-DOS, UNIX, VMS, VAX, Win	IQ Software. 404-446-8880	Menu-driven read only data retrieval and analysis; supports most flat ASCII files \$500 - \$42,500
Intelligent Query Access	MS-DOS, UNIX, VMS, VAX, Win	IQ Software. 404-446-8880	Report writer and query tool for end-user. Additional purchase in conjunction with IQ above for \$250 - 21,250.
M/TEXT	IBM 30XX, 43XX, 370/MVS, VSE, PC- MS/DOS, OS/2	Cincom Systems Inc. (513) 662-2300	Incorporates data into formatted text; typically used for mass mailing. Text process system which integrates with desktop publisher applications. Price: \$1,100 and up.
Mantis	IBM mainframes, OS/2, MS-DOS WINDOWS, UNIX, SUN	Cincom Systems Inc. 513-662-2300	4GL AD advantage document database that provides a completely interactive programming environment including sophisticated proto-typing capabilities. Price: \$900 and up.
SmartLeaf	HP-300/400/700- HPUX, Apollo- 3000/4000, Sun- 3/Spare/SunOS	Database Publishing Software 617-938-0018	Database publishing; links elements of Interleaf documents to SQL-based databases. Price: Server license (1-4 users) \$9,500, additional users \$2,250 ea.
Supra	IBM mainframes, OS/2; DEC ALPHA, VAXVMS, UNIX IBM RS/6000, MS- DOS, WIN	Cincom Systems Inc. 513 662-2300	RDBMS Document database. Price: Ranging from \$1,500 and up.

Desktop Publisher List

Tool	Platform	Vendor	Comments/Classification
ALL-IN-1	VMS, MS-DOS, Mac	Digital Equipment Corp. 800-344-4825	Includes WPS Plus with office automation options
Applixware formerly Asterix	UNIX, Sun, HP, Alpha	Applix, Inc. 703-734-3330	Workgroup, compound documents, engineering, database \$700 - 1500
CliqPage	MS-DOS, UNIX, Sun	Quadratronics Systems Inc. 818-865-6655	Desktop publisher; add-on module for CliqWord. Price: Hardware dependent, contact Vendor.
dbPublisher for Ventura	MS-DOS	Step Two Software 800-527-2506	Desktop publisher similar to dbPublisher-Professional but designed specifically to enhance Ventura Publisher. \$199
DocExpress	Sun, UNIX, IBM, HP	ATA Inc. 310-316-6350	Automatic generation of documentation, extracting information from Teamwork, placing it in Interleaf and FrameMaker documents. Price: Single User \$7,500; Multi-user, contact Vendor.
Interleaf 5 <SGML>	DEC, Ultrix, HP 700, SUN, X-Terminals, IBM RS 6,000	Interleaf, Inc. 301-982-0991	Desktop publisher Price: \$5,000
Interleaf 5	MS-DOS, UNIX, Sun, VMS, Data Gen Avionics, Digital MIPs, VAX, HP 9000, IBM 6000	Interleaf Inc. 301-982-0991	Desktop publisher. Price: \$2,500
Island Write	UNIX	Island Graphics Corp. 800-255-4499	Desktop publisher and graphics. Price: \$695.
Mecca III	SCO Xenix/UNIX	Amgraf Inc. 816-474-4797	Electronic publishing system with special capabilities for business form design publishing system. Price: Contact vendor
Pagemaker	Windows, Mac	Aldus Corp. 206-628-5739	Desktop publisher. Price: \$539 - \$639
PagePlus	Windows	Serif Inc. (800) 697-3743	Desktop publisher. Price: \$249. With licensing for 10 users, \$595.
QuarkXpress	Mac, Windows, cross-platform compatibility	Quark Inc. 800-788-7835	Desktop publishing for page layout. Price: \$895
Adept Publisher	UNIX	ArborText Inc. 313-996-3566	Electronic publishing software, CAL compliant. Price: Contact Vendor
The Publisher	UNIX	ArborText Inc. 313-996-3566	Desktop publisher for long, complex documents. Price: Contact Vendor.
Corel Ventura Publisher	Windows	Corel Ventura 619-673-7570	Desktop publisher. Price: \$299
WPS Plus	MS-DOS, VMS	Digital Equipment Corp. 800-344-4825	Desktop publisher. Price: Contact Vendor.
WiziWord	Windows, Mac, VMS, Sun, HP, Integraphic, SGI, IBM RS 6000, DEC, Ultrix	Microsystems Engineering Corp 708-261-0111	Desktop publisher. Price: \$395 - \$695.
Parlance Document Manager	Ultrix, IBM, Sun, Dec	Xyvision Inc. 617-245-4100	Integrated document production solution (uses Arbortext SGML Editor). This approach has very strong CM features, also with FrameMaker and other SGML editors. Price: Contact Vendor.

Appendix B: Documentation Product List

Document Management List

Tool	Platform	Vendor	Comments/Classification
BasisDesktop	Windows, UNIX, VMS	Information Dimensions 614-761-7311	Manages mixed object data and compound documents giving users access to components of compound documents. \$200.
BRS/SEARCH	MS-DOS, UNIX, VM, VMS, Sun, CMS	Main Street Software Inc. 212-779-8398	Full Text retrieval. Price: \$2,500 - \$80,000
CaMERA	MS-DOS, Sun, UNIX, VMS	Advanced Systems Technology Corp (ASTECC) 410-721-1167	DOS \$6,000; UNIX \$12,000
CD Author Hypertext	MS-DOS, UNIX	Dataware Technologies 703-883-8215	Uses SGML to create tables, indices, links to SGML documents. Price: \$18,000 to \$47,000.
DECimage Application Services	VMS, Ultrix	Digital Equipment Corp. 800-344-4425	Scanning, viewing, editing and printing of image data
DECimage Scan Software	VMS, Ultrix	Digital Equipment Corp. 800-344-4425	Digitizes, displays, manipulates. \$560.
DECimage Storage Manager	VMS	Digital Equipment Corp. 800-344-4425	Storage and retrieval of image data.
Discovery Addition	Windows	Watermark Software 617-229-2600	Allows images of incoming faxes and scanned documents to be manipulated, copied, stored, distributed by Windows applications. Price: \$149
DocWorx	Servers: UNIX, Novell PCs. Clients: Mac, Sun, Windows	Innovatech Corporation 619-793-8789	System allows capture and input, storage and management retrieval and output; also document routing. \$1200/seat
DSR Image	Model 2, Sun	Xerox Integrated Systems Marketing 801-535-8690	Search and retrieval. Price: \$700. each, Server \$6,000
EDCS II	Sun, VMS, MS-DOS, Ultrix	Digital Equipment Corporation 800-344-4825	Integration tool providing tracking, access control, change notification, and archiving of data across a network regardless of the source application.
WorkForce Desktop	IBM 6000, HP 9000	FileNet Corporation 714-966-3545	Managing Document Imaging and Workflow. Document storage and retrieval. Price: Contact Vendor.
FolioVIEWS	MS-DOS, Mac, Windows	Folio Corp. 801-375-3700	Text retrieval. \$495.
Ful/Text	DOS, UNIX, HP, OS/2, VMS, Mac,	Fulcrum Technologies Inc. 415-802-7050	Text-retrieval; management of large document collections. Price: Contact Vendor.
GESCAN	VMS	Digital Equipment Corp. 800-DIGITAL	Provides workflow capabilities including redlining; also full-text search.
GlobalView	See Xerox GlobalView	See Xerox GlobalView	see Xerox GlobalView in the Integrated Office Automation List
Guide Professional Publisher	Windows	InfoAccess 800-344-9737	Document management publishing system. Price: Contact Vendor
IMAGEWorks	RS/6000, Windows	Bull Worldwide Information Systems 508-294-4911	IMAGEWorks, Classic, FlowPATH, StreamPATH, OptiPATH, PrintPATH are all modules of the product suite IMAGEWorks. Price: \$1,900/user.
Imara	OS/2, Windows	Imara Research Corp. 416-581-1740	Document management. Price: \$10,000 for 5 users and up.
Intelligent Search	MS-DOS, UNIX	SoftSolutions Technology Corp. 801-226-6000	Search capability. File server \$250. Workstation \$195.
Keyfile	OS/2, Windows	Keyfile Corporation 603-883-3800	Filing, retrieving, sharing and distributing documents. Allows access to documents via their native application. Incorporates workflow into document management. Price: Single User \$995; Multi User, contact vendor.
M/ARCHIVE	IBM 370 MVS, VSE, PC-MS/DOX, OS/2	Cincom Systems Inc. 513 662-2300	Mainframe/PC information storage and retrieval system. Price: \$2,000 and up
Magellan	MS-DOS	Lotus Development Corp. 800-926-4874	Text search. Price: \$49

Document Management List

Tool	Platform	Vendor	Comments/Classification
Metamorph	MS-DOS, UNIX, Applicable Program Interface OS2, MAC, VMS	Thunderstone Software 216-631-8544	Text search and retrieval. Price: \$1,644
PageKeeper	Windows	Caere Corp. 800-535-7226	Document manager to organize, search, and retrieve documents of any origin. Price: \$595
PaperClip	Windows, MS-DOS	PaperClip Imaging 201-487-3503	Document and image managing system intelligently stores/retrieves documents and scanned images. Network \$1000/seat. Personal Edition \$595.
PixTex EFS	VMS, Sun, HP, RS6000, Ultrix	Excalibur Technologies 714- 724-4552	Electronic filing software. Price: Contact Vendor.
Rational Rose	VMS, UNIX, Sun, IBM, Windows	Rational 408-496-3600	Object-oriented development, hypertext links, MIF format for FrameMaker. Price: For IBM, SUN Sparc - \$3,995; For Windows and OS/2, \$495.00; For UNIX, Sun Sparc, \$3,995
RDM (Relational Document Manager)	Sun, HP 700, IBM RS 6000, Digital, Ultrix. Client: Win, MS-DOS, MAC	Interleaf Inc. 301-982-0991	Document storage, retrieval and management; supports large document collections; tracks revisions and schedules. Price: \$40,000
Re:Solution	MS-DOS	Digital Equipment Corp. 800-343-4040	Document management system. Price: Contact Vendor.
Re:View	MS-DOS, VAX, Mac	Digital Equipment Corp. 800-343-4040	View and redline drawings and multipage documents. Price: Contact Vendor.
SearchIt!	SunOS	SunSoft Inc. 800-USE-SUN-X	Indexes every word in a group of files to facilitate finding information quickly. Used with Open Windows, version 3.0. Price: \$249
Sherpa	MS-DOS, Mac, UNIX, VMS	Sherpa Corporation 408-433-0455	Product information management system to control data during design, revision, testing, approval and release. Price: Contact Vendor.
Soft Solution	MS-DOS, UNIX, Windows	SoftSolutions Technology Corp. 801-226-6000	Search and retrieval, document management. Price: Contact Vendor.
Sonar Professional	Mac, Windows	Virginia Systems Software Services Inc. 804-739-3200	High-end text retrieval, text searching, generates reports and, analyzes documents. Price: \$295
Text Retrieval	CICS, VSE, MVS	MacKinney Systems 417-882-8012	Text retrieval. Price: Single User, \$3,000; Multi-users, Discount after sixth copy. Contact Vendor.
TOPIC	MS-DOS, Ultrix, Sun, VMS, Windows	Verity Inc. 415-960-7711	Text retrieval. Price: \$595 per user; \$1,500 for Standalone.
Vertex Librarian	MS, Windows	Vertex Software 412-931-7600	Text retrieval categorization. Price: Contact Vendor.
RDM	VMS, VMXA, MVS, VMSP	Interleaf Inc. 301-982-0991	Electronic distribution and document retrieval. Price: Ranges from \$50,000 to \$110,000
WorldView Press	VMS, Ultrix, Sun, MS-DOS, HP, Apollo	Interleaf Inc. 301-982-0991	Takes documents from word processors, DTPs, CAD etc.; reformats for online viewing; compresses, adds hyperlinks & index. Price: \$10,000
WorldViewer	VMS, Ultrix, Sun, MS-DOS, HP, Apollo, MW-Win, Mac	Interleaf Inc. 301-982-0991	Allows user to view a document, attach comments, use hyperlinks & full text retrieval capabilities, zoom in and print. Price: \$195
ZyImage	Windows	Zylab Corp. 800-544-6339	Document imaging and retrieval system that integrates WordScan with ZyIndex. Price: \$995 Single user; for Network, contact Vendor.
ZyINDEX	MS-DOS, Windows	Zylab Corp. 800-544-6339	Full-text and retrieval. Price: \$395 single user; Network, \$995 (3 concurrent user packages)

Appendix B: Documentation Product List

Editor List

Tool	Platform	Vendor	Comments/Classification
Ada-ASSURED	HP-UX, Ultrix, Sun, RS-6000, HP9000, HP700, SGI, SunSPARC.	GammaTech 607-273-7340	Combines Ada language-sensitive editing with automated enforcement of Quality and Style Guidelines for Ada Programmers as recommended by AJPO. Price: \$1795, maintenance is \$325 annually.
Brief	MS-DOS, OS/2	Borland International 408-461-9000	Text editor. Price: \$100.
CCS/VI	HP1000, HP3000	Corporate Computer Systems 908-946-3800	Text editor. \$995 for HP1000, \$1295 for HP3000.
Cheetah	MS-DOS	Corsoft 800-441-1511	Full screen editor. \$145.
CodePad	Windows	Cognetic Systems Inc. 404-446-8312	Text editor. \$99.
DEC TPU	Ultrix	Digital Equipment Corp. 800-343-4040	Full screen text editor. Price: Contact Vendor.
Edix	MS-DOS, OS/2, UNIX, VMS	Emerging Technology 303-447-9495	Full page text editor. \$195 - \$5,750.
Edix/GS	Windows	Emerging Technology 303-447-9495	Text editor for GUI environments; allows programmers to stay in GUI while writing and testing. \$245.
EDT	VMS	Digital Equipment Corp. 800-343-4040	Full screen text editor. Price: Contact Vendor.
Epsilon	MS-DOS, OS/2	Corsoft 800-441-1511	Programmer's editor. \$250 for MS-DOS or OS/2 version. \$350 for combo version for both MS-DOS and OS/2. Price: Contact Vendor.
EVE	VMS	Digital Equipment Corp. 800-343-4040	Full screen text editor. Price: Contact Vendor.
ie	SPARC, HP-UX, AIX, Intel	Iris Computing Laboratories 505-988-2670	X Window-based programmer's editor. \$295/seat.
KEDIT	MS-DOS, OS/2	Mansfield Software Group 203-429-8402	Text editor, full screen \$180 - \$210
Multi Edit	MS-DOS	American Cybernetics 602-968-1945	Full screen editor. Standard \$129, Professional \$199.
Norton Editor	MS-DOS	Symantec 800-441-7234	Full screen editor. \$99
PVCS Professional Editor	MS-DOS, OS/2	Compuware 800-535-8707	Text editor. MS-DOS \$300, OS/2 \$300, combined \$400.
Qedit	MS-DOS, OS/2	Semware 404-641-9002	Text editor, configurable, multiple files/windows. \$59.
SGML TextWrite	OS/2	IBM Corp. 800-426-3333 800-333-6705 (Fed. Systems)	SGML editor to create, edit, and validate SGML compliant text. \$1890
SGML TextWrite Tools	OS/2	IBM Corp. 800-426-3333 800-333-6705 (Fed. Systems)	Modify and create SGML TextWrite editor applications. \$6235.
SoftQuad Author/Editor	Windows, Mac, UNIX	SoftQuad Inc. 416-239-4801	Text editor designed specifically for SGML. \$995.
SpeedEdit	SPARC, HP, AIX, SCO, Intel	Inclination Software Inc. 702-831-5595	Full-featured programmer's editor. \$295 to \$8000.
Syndie	MS-DOS	Corsoft 800-441-1511	Syntax-directed programmer's editor. \$495.
VAX LSE/SCA	VMS	Digital Equipment Corp. 800-343-4040	Language sensitive editor; permits language specific construct, completion, error detection & correction; source code analyzer. Price: Contact Vendor.

Editor List

Tool	Platform	Vendor	Comments/Classification
VAX TPU	VMS	Digital Equipment Corp. 800-343-4040	Full screen text editor. Price: Contact Vendor.
Vedit	MS-DOS, UNIX	Greenview Data Inc. 800-45-VEDIT	Text editor. \$89.
Vedit Jr.	MS-DOS, UNIX	Greenview Data Inc. 800-45-VEDIT	Text editor. \$29.
Vedit Plus	MS-DOS, UNIX	Greenview Data Inc. 800-45-VEDIT	Text editor. \$149.
ESW Code Change	MVS, ISPF,(IBM mainframe), OS/2	ViaSoft 303-740-6668.	Program editing component of Existing Systems Workbench for re-engineering. \$14,000 - \$62,000.
Wylbur	MS-DOS	Programmer's Paradise 800-445-7899	Text editor and application development system. Price: Contact Vendor.

Appendix B: Documentation Product Lists

Electronic Distribution List

Tool	Platform	Vendor	Comments/Classification
Acrobat Distiller	Windows, Mac	Adobe Systems Inc. 800-833-6687	Document transmission and display, \$695.
Acrobat Exchange	Windows, Mac	Adobe Systems Inc. 800-833-6687	Creates electronic documents through the printer-driver mechanism on a Mac or Windows-based PC. \$195
Acrobat Reader	Windows, Mac	Adobe Systems Inc. 800-833-6687	View, navigate or print documents created by Acrobat Distiller. \$50.
Common Ground	Windows, Mac	No Hands Software 800-598-3821	Document transmission and display. \$190
Dynatext	Windows, UNIX, Mac	Electronic Book Technologies 415-960-3089	Displays SGML documents in browse mode; also prints SGML documents. Price: \$150 per user, or \$1,000 unlimited.
Replica	Windows	Farallon Computing 510-814-5100	Creates electronic documents through the printer-driver mechanism on a Windows-based PC. \$99.
Replica viewer	Windows	Farallon Computing 510-814-5100	View, navigate or print documents created by Replica. No cost.
Viewstation PLUS	VMS, VMXA, MVS, VMSP	Interleaf Inc. 301-982-0991	Electronic distribution and document retrieval. Price Range: \$50,000 to \$110,000
WorldView Press	VMS, Ultrix, Sun, MS-DOS, HP, Apollo	Interleaf Inc. 301-982-0991	Takes documents from word processors, DTPs, CAD etc.; reformats for online viewing; compresses, adds hyperlinks & index. Price \$10,000
WorldViewer	VMS, Ultrix, Sun, MS-DOS, HP, Apollo, MS-Win, MAC, Data Gen Avionics.	Interleaf Inc. 301-982-0991	Allows user to view a document, attach comments, use hyperlinks & full text retrieval capabilities, zoom in and print. Price: \$195

Extract from Source Code List

Tool	Platform	Vendor	Comments/Classification
ADS	IBM MVS	A+ Software Inc. 315-685-6918	Generates and maintains documentation based on JCL, system catalogs, and VTOCs. Price: Contact Vendor.
C-DOC	MS-DOS, Windows	Software Blacksmiths Inc. 416-858-4466	Produces table of contents, tree diagrams, metrics, variables cross-reference, and pretty printouts. Also generates comments regarding calls and identifiers for each C-code function. \$199 - \$299.
DocGen	UNIX, VMS	Software Systems Design Inc. 909-625-6147	Produces 2167A docs from annotated Ada source code. \$5000 and up.
DocIt	MS-DOS	20/20 Software Inc. 503-520-0504	Provides documentation about the structure design and status of Paradox data structures. \$129.
Ensemble	Sun	Cadre Technologies 800-743-2273	Parses C code to produce documentation for Interleaf. \$8000 and up.
DocGen/FTN	UNIX, VMS, Sun, MS-DOS, Apollo	Software Systems Design Inc. 900-625-6147	Part of FREDoc for reverse engineering Fortran. Produces 2167A documents from Fortran source code. \$5000 and up.
Hindsight	MS-DOS, UNIX, VMS	Advanced Software Automation 408-492-1668	Produces diagrams and documentation from code. \$1,450 metrics module, \$8,450 full product.
SourceDoc	MS-DOS, OS/2	Intelligent Solutions Inc. 612-884-0200	Scans source code for embedded key words and generates document text based on the source code scanned. \$345 - \$600.

Filter/Translator List

Tool	Platform	Vendor	Comments/Classification
A1- Access	MS-DOS, VAX, Mac, Windows	ECAP Systems Inc. 613-764-3889	Integrates WordPerfect PC-DOS and ALL-IN-1. \$49 - \$150 per user. (15 user minimum)
Alias Eclipse	Silicon Graphics	Alias 203-270-9622	File conversion & connectivity to all major industry file formats, image editing for graphic design. Price: \$5,995.
Alias Separator	Silicon Graphics	Alias 203-270-9622	Provides RGB-to-CMYK conversion with advanced tools to help refine image separations for print. Price \$3,995
Automatic Choice	UNIX, HP-UX	Audre Inc. 619-451-2260	Automatic digitizing and recognition; converts hardcopy images to raster or vector. Tech pubs conversion and CALS documation conversion. \$30,000.
CDA Converter Library	VMS, Ultrix, Sun, MS-DOS	Digital Equipment Corp. 800-344-4825	File conversion for application software.
CGM-View	UNIX	Advanced Technology Center 714-583-9119	Converts computer graphics metafiles to HPGL and PostScript; filter for print spoolers in networks to provide background printing. \$1195
CliqDCA	MS-DOS, UNIX, Sun	Quadratron Systems Inc. 818-865-6655	Convert external application files to CliqWord format. Hardware dependent, contact Vendor.
Cloverleaf	Sun, HP, Apollo, VMS,MS-DOS, UNIX, Data Gen Avionics, Digital	Interleaf Inc. 301-982-0991	Filter building tool; layered application to Interleaf 5 and TPS 4. Price: \$5,000
Data Junction	MS-DOS, UNIX, Sun, HP, RS6000	Tools and Techniques Inc. 800-580-4411	Converts data files to and from many databases, spreadsheets, ASCII and EBCDIC files. \$99 to \$499.
FastTAG	MS-DOS, UNIX, VMS, RS 6000, Windows, OS/2, HP 9000, SGI	Avalanche Development 303-449-5032	Generates CALS compliant SGML files from ascii files; also converts data among various application program formats, in addition to converting from Word Perfect and RTF for Windows. Price: PC platform, \$2,700; UNIX, \$3,100
Filtrix	Sun, Apollo,HP, Motif DEC 3100, RS6000	Blueberry Software 707-829-5443	Converts data among various application program formats. \$795.
ForConvert	UNIX	Advanced Technology Center 714-583-9119	Converts raster scanned images into popular vector graphics formats. \$5,995
ForReview/Translate	UNIX, Windows	Advanced Technology Center 714-583-9119	Displays CGM files; graphics file conversions \$595 - 1495
Graphics Link Plus	Mac	HSC Software 800-845-7587	File conversion. Price: Contact Vendor.
HiJaak 2.1	MS-DOS	Inset Systems Inc 800-374-6738	Graphics capture and conversion. \$189.
HiJaak Pro	Win	Inset Systems Inc 800-374-6738	Graphics capture and conversion. \$169.
HiJaak PS 2.1	MS-DOS	Inset Systems Inc 800-374-6738	Writes AND READS EPS files, where normal HiJaak will only write EPS files. \$175.
InSet 2.2C	MS-DOS	Inset Systems Inc 800-374-6738	Allows merging of text and graphics on applictions that won't ordinarily merge the two (dBase, etc.) \$89.
KEYpak	MS-DOS, Sun, VMS, MVS, VM, Ultrix	Keyword Office Technologies 403-250-1770	Document interchange. \$2000 and up for 50 users.
KEYpak	VMS, Ultrix	Digital Equipment Corp. 800-344-4825	Network based document exchange. Filters for document interchange between major word processors
Omnimark	MS-DOS, Mac, OS/2, Windows, UNIX	Software Exoterica Corp. 613-722-1700	Prepares SGML documents for use by text formatters and database systems. Also translates scanned documents to SGML. \$2,495 - \$150,000.
OMTool	Sun, UNIX	GE Advanced Concepts Center 800-438-7246	Exports diagrams to PostScript, Interleaf and FrameMaker. \$995.

Appendix B: Documentation Product Lists

Filter/Translator List

Tool	Platform	Vendor	Comments/Classification
PictureEze 2.0	Win	Application Techniques 508-433-5201	Graphics file conversion and viewing utility
R-Doc/X and WordPort	MS-DOS, OS/2, Enable	Advanced Computer Innovations 716-385-3810	Document conversion for WordPerfect, MS Word, WordStar, Ami Pro, DisplayWrite, Signature, Multimate, MASS-11, more. Price: \$149 per user. With Combination R-DOC/X and Word Port, \$195.
SGML Hammer	MS-DOS, Sun, SGI	Avalanche Development 303-449-5032	Extracts info from SGML files and imports into other non-SGML files such as word processors & databases. MS-DOS \$1500, other \$2100.
SGML Translation	MS-DOS, Apollo, Sun	Shaffstall Corp. 317-842-2077	SGML translator and data conversion. Price: \$6,000 to \$20,000
SGML Translator	VM, MVS	IBM Corp. 800-426-3333 800-333-6705 (Fed. Systems)	Reads, validates, and translates SGML markup for document composition. \$23,830.
Word for Word	MS-DOS, Mac, OS/2 Windows, VM/CMS	Mastersoft 800-624-6107	Conversion utilities (filters) for word processors. Also offers spread sheet capability. Price: Beginning \$149 per user. Multi-User, contact Vendor.

Fonts List

Tool	Platform	Vendor	Comments/Classification
DL	VAX	ECAP Systems Inc. 613-764-3889	Font library. \$1300 - \$2600.
Freedom of Press	UNIX, Mac, Windows, MS-DOS	Color Age Inc. 800-4-FREEDOM	Fonts and clip art for non-PostScript printers. \$1495.
KeyFonts Pro	TruType, PostScript	Softkey Inc. 800-227-5609	Fonts \$40
StrataType 3D	Mac	Strata Inc. 801-628-5218	Transforms system font into 3D type (ability to change viewpoints, etc.) \$199
Microsoft Truetype Fonts	Windows, Mac	Microsoft Corporation 800-227-4679	Fonts \$70

Forms List

Tool	Platform	Vendor	Comments/Classification
CliqForm	MS-DOS, UNIX, Sun	Quadratron Systems Inc. 818-865-6655	Form builder and database. Price: Hardware dependent, contact Vendor.
FormFlow	Windows	Delrina Technology Inc. 800-268-6082	Forms package to automate the flow of forms or procedures. Manager and Filler module \$399, Filler module \$199.
InForms for Windows	Win	WordPerfect Corp. 800-451-5151	Electronic forms package \$495
JetForm	Win, MS-DOS, Mac	JetForm Corp. 617-647-7700	Add-on product that sits on cc:Mail or Microsoft Mail; used to route forms within an organization. \$495 for five users.
PerformPro	MS-DOS, Text, DOS GEM, Windows, Mac- filler	Delrina Technology Inc. 703-883-0180	Form tool. Price: Filler price, \$199
PerformPro Plus	Windows,	Delrina Technology Inc. 800-268-6082	Form tool. Price: Filler, \$199; Designer, \$399
FormWorx	MS-DOS, Windows	Power Up Software 800-851-2917	Form designer

Flowcharting List

Tool	Platform	Vendor	Comments/Classification
ABC Flowcharter 2.0	Win	Micrografx Inc 800-733-3729	Flowcharting w/ redesigned DLL (can incorporate clip art as a symbol). \$495.
allClear	MS-DOS, Windows	Clear Software Inc. 800-338-1759	Flowcharting. \$300.
Clear for C and Clear for dBASE	MS-DOS	Clear Software Inc. 800-338-1759	Automatically creates flowcharts, tree charts, or formatted source prints from C code or dBASE compatible code. \$1,995.
Easyflow 7.0	MS-DOS	HavenTree Software 613-544-6035	Create & revise dataflow diagrams, flowcharts and organization charts. \$280.
Flow Charting 3	MS-DOS, Windows	Patton & Patton Software Corp 408-778-6557	Flowchart generator. Price: \$250 MS-DOS, \$315 Windows.
Meta Design 3.0 (Mac), 3.0 M2 (PC)	Mac, Win, MS-DOS	META Software 617-576-6920	Flowcharting and diagramming tool. Price: Contact Vendor.

Graphics/Presentation List

Tool	Platform	Vendor	Comments/Classification
Aldus Freehand	Mac and Windows	Aldus Corp. 206-628-4515	Draw, graphics, artist package. Price: \$350 - \$399
Applause 1.5	MS-DOS	Borland International 800-331-0877	Graphing, charting, drawing. Price: Contact Vendor.
CA-Cricket Image 2.0	Win	Computer Associates Intl. Inc. 703-709-4923	Raster-based image manipulation and file format conversion program. \$92
CA-Cricket Paint 1.0	Win, Mac	Computer Associates Intl. Inc. 703-709-4923 (Robin Schwartz)	Raster-based program to produce 24 bit graphic images. \$92.
CA-Cricket Presents 1.4	Win, Mac	Computer Associates Intl. Inc. 703-709-4923 (Robin Schwartz)	Package for creating briefings & presentations. \$92 Windows, \$129 for Mac.
Charisma	Win	Micrografx Inc. 800-733-3729	Graphics, presentation. \$495.
ColorStudio 1.5	Mac	Fractal Design Corp. 408-688-8800	Image editing. Price: Contact Vendor.
CorelDraw	Windows, UNIX, OS/2	Corel 716-423-8200	Draw. \$595 Windows, \$595 UNIX, OS/2
Easy Color Paint	Mac	MECC 800-685-6322	Paint. \$60
Freelance Graphics	MS-DOS, Windows, OS/2	Lotus Development Corp. 800-926-4874	Presentation graphics. Price: \$379.
Full Color Retouch 3.2.5	Silicon Graphics	Alias Full Color 203-270-9622	Image compositor. Price: Contact Vendor.
GRAFPAC-CGM 1.1	UNIX	Advanced Technology Center 714-583-9119	Graphics subroutine library enables applications to output Computer Graphics Metafiles in binary, character, or clear text; vector based graphics exchange \$1995.
GRAFPAC-GKS 3.3	UNIX	Advanced Technology Center 714-583-9119	Graphics subroutine library conforming to Graphical Kernel System (GKS) \$1995
Harvard Graphics	Win, MS-DOS	Software Publishing Corp. 408-986-8000	Presentation. Price: Contact Vendor.
HiJaak	MS-DOS, Win	Inset Systems Inc. 800-374-6738	Graphics capture and conversion. \$169 Windows, \$189 MS-DOS.
Hollywood 1.0 V2	Win	Claris Corp. 800-325-2747	Graphics presentation. Price: Contact Vendor.
Ovation	UNIX	Visual Engineering Inc. 408-452-0600	Graphics, charting, illustration, image management. \$795.
Picture Publisher 3.1	Win	Micrografx Inc. 800-733-3729	High end image editor. \$595.
PowerPoint 3.0	Win, Mac	Microsoft Corp. 800-227-4679	Presentation, graphics. Price: \$495.
Quality Graphics	UNIX	Quality Software Products 310-410-0303	Displays many graph types base on user selection, works with Q-calc. Price: Contact Vendor.
SAS/Graph Software	MS-DOS, OS/2, MVS, CMF, VMS, UNIX	SAS Institute 919-677-8000	High end presentation and graphics. \$1,205.

Grammar/Spelling Checker List

Tool	Platform	Vendor	Comments/Classification
Corporate Voice	MS-DOS	Scandinavian PC Systems Inc. 800-487-7727	Builds style profiles (word and sentence length, vocabulary) canned profiles are included. Price: Contact Vendor.
Grammatik	MS-DOS, Windows, Mac	WordPerfect Corp. 801-225-5000	Grammar and style checker. \$99
Jspell	HP1000	Corporate Computer Systems 908-946-3800	Spell checker. \$750
Microsoft Word Comprehensive Spelling Dictionary	Windows, Mac, MS- DOS	Alki Software 800-669-9673	Adds 74,000 words to the Microsoft Word spell checker. \$80
Microsoft Word Comprehensive Thesaurus	Windows, Mac, MS- DOS	Alki Software 800-669-9673	Triple the number of keywords and synonyms in Microsoft Word. \$50.
Proof Positive	Sun, UNIX, RS6000	Avalanche Development Company 303-449-5032	Interleaf 5 add-on; spell checker, grammar and style checker, readability index. Price:
RightWriter	MS-DOS, Mac, Windows	Que Software div. of MacMillan Computer Publ. 800-992-0244	Grammar checker \$50.
Thoroughbred	MS-DOS, VMS, UNIX, Novell	Concept Omega Corp. 908-560-1377	Spell checker. 800-524-0430 for pricing.
VAX DECspell Verifier/Corrector	VMS	Digital Equipment Corp. 800-344-4825	Spell checker. \$479 - \$28,373.
VAX Grammar Checker	VMS	Digital Equipment Corp. 800-344-4825	Grammar checker. \$479 - \$29,211.
VAX Language and Specialized Lexicons	VMS	Digital Equipment Corp. 800-344-4825	Spell checks based on user's phonetic spelling attempt. Price: Contact Vendor.

Appendix B: Documentation Product Lists

Hypermedia List

Tool	Platform	Vendor	Comments/Classification
AnyMedia and AnyImage	Windows	Hercules Inc. 813-572-3254	Provides full motion video as Hot Spot Links in documents created by AnyImage. Provides document retrieval and hypertext. Price: Authoring \$8000, AnyMedia \$1200, AnyImage
AutoLinker	MS-DOS	Ntergaid 203-380-1280	A filter-building utility that can be trained interactively to recognize different types of coding in ASCII documents. Price: \$695
Authorware Professional	Windows, Mac	Macromedia 800-288-4797	Icon-based authoring tool. Creates multimedia computer-based learning and training systems. \$4,995 - \$7,995.
Canon Still Video System	MS-DOS, Mac	Canon USA Still Video System Division 516-488-6700	Still video imaging. Price: \$2600 - \$4600.
Dynatext	Windows, UNIX, Mac	Electronic Book Technologies 415-960-3089	Displays SGML documents in browse mode; also prints SGML documents. Price: \$150 per user, or \$1,000 unlimited.
FrameReader	MS-DOS/Windows, Mac, UNIX	Frame Technology Corp. 408-428-6105	Display and print on-line hypertext documents. Price: \$8,995 (Applies to version 3.0 only).
FrameViewer	MS-DOS/Windows, Mac, UNIX	Frame Technology Corp. 408-428-6105	Displays on-line hypertext documents. Used with FrameReader. Price: \$299
HyperWriter	MS-DOS	Ntergaid 203-380-1280	Interactive creation of hypermedia documents. Price: \$495
Multimedia ToolBook	Windows, OS/2	Asymetrix Corp. 800-448-6543	Allows non-programmers to build dialog boxes, list-box fields and 3D buttons. Price: \$695.
QuickTime	Mac	Apple Computer Inc. 800-998-APPLE	Allows playback, incorporating, editing and creating of digital videos. Price: \$115.
SoftCraft Presenter	Windows	SoftCraft Inc. 800-351-0500	Multimedia presentation. \$595.
Video for Windows	Windows	Microsoft Corporation 800-227-4679	Allows playback, incorporating, editing and creating of digital videos. Price \$199.

Integrated Office Automation List

Tool	Platform	Vendor	Comments/Classification
ABC Office Pack	MS-DOS, Windows	Software Trust 714-497-3600	Integrated package; word processor, spreadsheet, database. Price: Sold out until 1996.
CliqAccessories	UNIX, Sun	Quadratron Systems 818-865-6655	Phonebook, scheduler, e-mail. Price: Dependent on hardware and number of users; begins at \$645.
CONNECT	HP1000	Interactive Computer Technology 612-770-3728	Connectivity. \$750
Enable OA	MS-DOS, OS/2	Enable Software Inc. 800-888-0684	Integrated package with word processor. Price: \$795.
Framework	MS-DOS	Borland International 800-331-0877	Integrated package with word processor. Price: \$695 single; \$295 for each additional user.
GeoWorks Ensemble	MS-DOS	Geoworks Inc. 510-644-0883	Word processor, draw, communications. Price: Contact Vendor.
GOLDMEDAL WorkGroup	UNIX, Sun	Decathlon Data Systems 303-440-9000	Office applications to facilitate group communications and scheduling activities. \$395, four users \$1900.
Microsoft Works	MS-DOS, Windows, Mac	Microsoft Corporation 800-227-4679	Integrated package including word processor, spread sheet, presentation graphics; and on PCs, communication or drawing. Price: \$295
Microsoft Works For Windows	Windows	Microsoft Corporation 800-227-4679	Integrated package with word processor, spread sheet, presentation graphics, and on PCs, communication or drawing. Price: \$295
Open Office Power	Sun	ICL & LEXIA 703-648-3300	Integrated package with word processor, graphics, conversion. Price: Contact Vendor.
QED Office	MS-DOS	Strategy Marketing Associates 310-378-7632	Office automation including document creation. Price: Contact Vendor.
R O Plus	MS-DOS, UNIX	RSYS Inc. 214-343-9210	Office automation with word processor. Price: Contact Vendor.
SAS System	MS-DOS, OS/2, MVS, CMF, VMS, UNIX	SAS Institute 919-677-8000	Integrated package including SAS/FSP. Price: \$940 and up depending on hardware and number of users.
SmartSuite	Windows	Lotus Development Corp. 800-926-4874	Includes 1-2-3 for Windows, Freelance Graphics, Ami Pro, and cc:Mail. Approach Database. Price \$299
SmartWare II	MS-DOS, UNIX	Angoss Software International 416-593-1122	Integrated package with word processor. \$689.
Surefire	MS-DOS	Public Brand Software 800-426-3475	Word processor that lets you build databases and spreadsheets within your documents. \$29 - \$69.
WordPerfect Works	MS-DOS	WordPerfect Corp. 800-451-5151	Integrated package with LetterPerfect, flat file database, graphics editor, communications package, spreadsheet. \$159 single user, additional license \$95 w/o documentation.
Xerox Global View	MS-DOS, OS/2, Sun Sparc, IBM, Windows	Xerox Corporation 801-535-8690	Point-and-click interface including document editing and office automation. Price: \$795 to \$1,495

Appendix B: Documentation Product Lists

Miscellaneous List

Tool	Platform	Vendor	Comments/Classification
ADS/MVS	MVS/XA	A+ Software 315-685-6918	On-line system documentation generator. Data management built in, flowcharting capability, DASD management; JCL syntax checking, source program documentation capability. \$16,000 - \$32,000.
ADW/DOC	OS/2	KnowledgeWare, Inc. 404-231-8575	Facilitates and enhances management, production, and tracking of deliverables for development lifecycle. Price: \$4,050 - \$10,750.
CaseWare/CM	Sun, UNIX, HP, RS6000	CaseWare Inc. 714-453-2200	Configuration management for objects including FrameMaker documents. Price: \$4,000.
CCS/Grep	HP1000, HP3000	Corporate Computer Systems 908-946-3800	Searches for string patterns. \$500 - \$1,000.
Cdrl-gen	MS-DOS	Logicon 619-458-9098	Preparation of DD1423. \$195.
CPG (Cobol Program Generator)	MS-DOS, OS/2, UNIX, VMS, VSE	David R. Black & Associates 216-688-2741	Cobol code documentation. Price: \$50,000 - \$70,000.
Corporate Voice	MS-DOS	Scandinavian PC Systems Inc. 800-487-7727	Builds style profiles (word and sentence length, vocabulary). Canned profiles are included. Price: \$250.
DOC-AID	MVS	Allen Systems Group 800-93-ALLEN	JCL documentation generator. Price: \$31,000 - \$88,000.
DocExpress	Sun, UNIX, IBM, HP	ATA Inc. 310-316-6350	Automatic generation of documentation, extracting information from Teamwork, placing it in Interleaf and FrameMaker documents. Price: Single User \$7,500; Multi-user, contact Vendor.
DocuComp	MS-DOS, Mac	Master Soft 602-948-4888	Document comparison. Price: \$179.
DocuForm	MS-DOS, HP-UX	Advanced Systems Technology Corp (ASTEC) 410 721-1167	Formatting tool often used with CaMERA. Produces an ASCII file to be sent to a laser printer or desktop publisher for enhancement. Price: \$1,000
Document Director	MS-DOS	Compliance Automation, Inc. (CAI) 713-486-7817	Requirements traceability, text editor, database. Single User, \$4,950 and up; contact Vendor.
DoDExpress	Sun, UNIX, IBM, HP	ATA Inc. 310-316-6350	Automatic generation of documentation, extracting information from Teamwork, placing it in Interleaf and FrameMaker documents. Price: Single User \$7,500; Multi-user, contact Vendor.
INSIGHT/2167A	MS-DOS	Logicon 619-458-9098	Training/reference guide for DoD-STD-2167A. \$99.
International Lexicons	VMS, Sun, MS-DOS, Ultrix	Digital Equipment Corp. 800-344-4825	Encoded lists include the most frequently used words for a specific language. Price: Contact Vendor.
KnowledgeMan	MS-DOS, OS/2,	mdbs 800-344-5832	Rapid application development environment; includes text. Price: \$1,500 - \$3,500.
MacSpin	Mac	Abacus Concept 800-666-STAT	Converts raw numerical data to 3D graphics for analysis. Price: \$295.
MacTopas Pro	Mac	Crystal Graphics 800-779-3535	3-D modeling. Price: \$20.
METACHECK	UNIX, MS-DOS	Advanced Technology Center 714-583-9119	Conformance analyzer for computer graphics metafiles \$1495 - 3995
Method I (Foundation)	MS-DOS, Windows, MVS, OS/2, VMS	Andersen Consulting 800-541-7512 415-546-8200	Produces documentation based on inputs provided to the Foundation CASE tool by the user; the documentation module of Foundation. Price: Contact Vendor.

Miscellaneous List

Tool	Platform	Vendor	Comments/Classification
Outpost	IBM (MVS, VM,	Trax Softworks Inc. 310-649-5800	Creates PostScript files. Price: 10 users \$2,710.
PV-WAVE	Sun, Ultrix, VMS,SGI, Alpha, HP, Windows	Precision Visuals Inc. 800-447-7147	Visual data analysis. \$3,000 to \$6,000
Source Print +	MS-DOS, Windows	Powerline Software Inc. 800-257-5773	Source code analysis tool simplifies formatting, debugging and printing. Price: \$249.
Synopsis for Smalltalk	Windows, OS/2	Synopsis Software 919-847-2221	Automatic documentation for OOP: generates class documentation for any class in the system. Requires ENVY/developer. Price: \$300 - \$400.
TAILOR/2167A	MS-DOS	Logicon 619-458-9098	Prompts for project requirements and then determines which 2167A standards are applicable. \$195.
TAILOR/DIDs	MS-DOS	Logicon 619-458-9098	Used withTAILOR/2167A to define the deliverables for a project. \$195.
Via/Smart Doc	MVS, TSO, CICS,	Viasoft Inc. 800-525-7775	Creates program documentation as changes are made to the code; driven by Analytical Engine. Price: \$16,000 - \$73,000.
XL/DOC	MS-DOS, Windows, OS/2, VMS, UNIX	Solutron Inc. 714-327-4615	Documentation component of the CASE tool "Excelerator". Price: \$1200 - \$3250.

Appendix B: Documentation Product Lists

Page Layout List

Tool	Platform	Vendor	Comments/Classification
Adobe Illustrator	Win, Mac	Adobe Systems Inc. 800-83-FONTS	Graphics; page layout. Price: Contact Vendor.
Archetype Designer	Win	Archtype Inc 617-890-7544	Page make-up program. Price: \$995.
FutureComp 3.13	MS-DOS, OS/2, UNIX, Sun	Quality Software Inc 617-965-2231	Composition and page makeup. Price: \$11,500 - \$50,000.
Microsoft Publisher	Windows	Microsoft Corporation 800-227-4679	Page layout. Price: \$139.
Ready Set Go	Mac	Manhattan Graphics 800-572-6533	Page design software. Price: \$395.

Scanning List

Tool	Platform	Vendor	Comments/Classification
CA-Cricket Image 2.0	Win, Mac	Computer Associates Intl Inc 703-709-4923	Raster-based image manipulation and file format conversion program. \$92 Windows, \$129 for Mac.
ColorStudio 1.5	Mac	Fractal Design Corp. 408-688-8800	Image editing. Price: \$800.
DECImage Application Services	VMS, Ultrix	Digital Equipment Corp. 800-344-4825	Scanning, viewing, editing and printing of image data. Price: Contact Vendor.
DECImage Scan Software	VMS, Ultrix	Digital Equipment Corp. 800-344-4825	Digitizes, displays, manipulates. Price: Contact Vendor.
DigitalPhoto	Sun, IBM, UNIX	Pectronics 617-577-1033	Image editor & processor \$1299 - \$2499.
EasyRead	Sun, IBM, UNIX	Pectronics 617-577-1033	Optical character recognition software \$995.
EasyScan	Sun, IBM, UNIX	Pectronics 617-577-1033	Color image scanning system \$995 - \$3,000
Eclipse	Silicon Graphics	Alias Full Color 212-268-4900	Image compositor. Price: \$6,000.
Enhance 2.02	Mac	MicroFrontier 515-270-8109	Image processor. \$375
PhotoFinish	Windows	ZSoft 800-843-5514	Image Editor supporting more than 60 scanners and the following formats: PCX, TIF, GIF, BMP, TGA, MSP, JPEG, Kodak, Photo
K6200	Windows	Kurzweil (Division of Xerox Imaging Systems) 508-977-	Character recognition. Price: Contact Vendor.
M/Series Professional	Win PC/AT	Calera Recognition Systems 408-720-8300	OCR for high end users. Price: \$1,700.
Omnipage Professional	Windows, Mac	Caere Corp. 800-535-7226	Page recognition software. Price: \$695
Omnipage 386	Windows, Mac	Caere Corp. 800-535-7226	Page recognition software. Price: \$495
Picture Publisher	Win	Micrografx Inc 800-733-3729	High end image editor. \$595.
Pixel!FX 2.0		Interleaf Inc. 800-955-5323	Interface to HP, Howtek, Sharp, Agfa scanners provides image editing, image conversion, OCR. Price: \$1,600.
Re:Scan	VAX	EA Systems Inc. 510-748-4700	Software control of scanner functions; includes preview, scan, density, and format settings. Price: Contact Vendor.
ScanWorx	MS-DOS, Mac, Sun, RS/6000, HP700	Xerox Imaging Systems 508-977-2000	OCR software, works with ScanWorx product. Price: Including scanner and software \$1,495
TextBridge	Windows, Mac	Xerox Imaging Systems 800-248-6550	Optical character recognition. \$99.
Ultrpaint	Mac	Deneba Systems 305-596-5644	Paint editing (bitmaps). Price: Contact Vendor.
WinRIX 1.1H	Win	RIX SoftWorks Inc. 714-476-8266	24 Bit image editor. Price: Contact Vendor.
WordScan	Windows, Mac	Calera Recognition Systems 408-720-8300	Optical character recognition. Price: \$295.

SGML-Based/CALS List

Tool	Platform	Vendor	Comments/Classification
Adept Document Architect	UNIX	ArborText Inc. 313-996-3566	Development tool, customized applications. Pricing: \$4,950 single, \$850 for mandatory maintenance first year.
Automatic Choice	UNIX, HP-UX	Audre Inc. 619-451-2260	Automatic digitizing and recognition; converts hardcopy images to raster or vector. Tech pubs conversion and CALS documentation conversion.\$30,000.
CD Author Hypertext	MS-DOS, UNIX	Dataware Technologies 703-883-8215	Uses SGML to create tables, indices, links to SGML documents. Price: \$30,000.
Dynatext	Windows, UNIX, Mac	Electronic Book Technologies 415-960-3089	Displays SGML documents in browse mode; also prints SGML documents. Price: \$150 per user, or \$1,000 unlimited.
FastTAG	MS-DOS, UNIX,VMS,RS6000	Avalanche Development 303-449-5032	Generates CALS compliant SGML files from ASCII files; also converts data among various application program formats. Price: \$1,500 MS-DOS, \$2,100 UNIX.
ForReview/Translate	UNIX, Windows	Advanced Technology Center 714-583-9119	Displays CGM files; graphics file conversions \$595 - 1495
InContext for Microsoft Windows	Windows	XSoft, A Division of Xerox 415-424-0111	Windows-based editor for creating, editing, and refining SGML documents. \$995.
Intellitag	UNIX, DOS	WordPerfect 800-451-5151	Conversion of WordPerfect documents to SGML. \$495 DOS, Additional license \$295. Sun \$495.
Interleaf CALS	Sun, HP 9000, Series 700, Digital MIPs, Ultrix, IBM RS 6000.	Interleaf Inc. 301-982-0991	Read and write 1840A tapes, validate SGML files, import/edit/export graphics using CALS Phase I formats, convert SGML. Price: \$12,500
Omnimark	MS-DOS, Mac, OS/2, Windows	Software Exoterica Corp. 613-722-1700	Prepares SGML documents for use by text formatters and database systems. Also translates scanned documents to SGML. Price: \$2,495.
Publishing Systems Process Master	VM, MVS	IBM Corp. 800-426-3333 800-333-6705 (Fed. Systems)	Transforms graphics and images, enables document composition, facilitates printing of CALS-compliant documents. Price: \$17,040 - \$27,670.
Smart Editor	MS-DOS, Windows	Auto-Graphics Inc. 800-776-6939	SGML editor works with one or more user defined DTDs for SGML applications. SGML structure validated during input. Price: \$3,995 single seat.
SGML Hammer	MS-DOS, UNIX	Avalanche Development 303-449-5032	Extracts info from SGML files and imports into other non-SGML files such as word processors & databases. Price: \$1,500 MS-DOS, \$2,100 UNIX.
SGML Translation	MS-DOS, Apollo, Sun	Shaffstall Corp. 317-842-2077	SGML translator and data conversion. \$6,000 to \$20,000
SGML Translator	VM, MVS	IBM Corp. 800-426-3333 800-333-6705 (Fed. Systems)	Reads, validates, and translates SGML markup for document composition \$23,830.
SQL *ILSA	OS/2,VMS, Sun	Omega Logistics International 714-524-5000	Interleaf add-on for CALS compliant technical manuals which match Logistics Support Analysis Record (LSAR). Price: \$18,500 - \$33,300.
TagWrite	Windows	Zandar Corp. 802-365-9393	Translates most word processing files in and out of SGML. \$1,700.
Xerox Docubuild SGML	VMS	Xerox Corporation 801-535-8690 800-428-2995	Enables documents to be parsed and validated with DTDs. Supports reading and writing of 1840A tapes. Price: Contact Vendor.

Technical Drawing List

Tool	Platform	Vendor	Comments/Classification
Designer ATM/OLE	Win	Micrografix Inc. 800-733-3729	Technical illustration, includes adobe fonts, etc. \$695.
Drafix Cad Qwikstart	MS-DOS	Foresight 800-231-8574	Technical drawing. \$495.
Drafix Cad Ultra	MS-DOS	Foresight 800-231-8574	Technical drawing. \$395.
Drafix Windows Cad	Win	Foresight 800-231-8574	Technical drawing. \$495,
Generic CADD	MS-DOS	Autodesk Retail Products 800-228-3601	Technical drawing. \$495.
Illustrator II	Sun, Ultrix, HP-UX, RS6000	InterCAP Graphic Systems 410-224-2926	Technical drawing. \$27,300
MapCon	Mac	ComGrafix Inc. 813-443-6807	Technical drawing. \$2000.
MetaLink	Sun, Ultrix, HP-UX, RS6000, X-terminals	InterCAP Graphic Systems 410-224-2926	Permits linking of graphics in interactive electronic manuals. Authoring \$7500, runtime \$1000.
Painter	Win, Mac	Fractal Design Corp. 408-688-8800	Simulates natural media (full color). \$399
Quik edit	Sun, Ultrix, HP-UX, RS6000, X-terminals	InterCAP Graphic Systems 410-224-2926	Abbreviated version of Illustrator II. \$3950.
Red-Liner	Sun, Ultrix, HP-UX, RS6000, X-terminals	InterCAP Graphic Systems 410-224-2926	Viewing and markup of graphics. \$995.
Sketcher	Win, Mac	Fractal Design Corp. 408-688-8800	Simulates natural media (grayscale). \$79.
Add Depth	Mac	Ray Dream 800-846-0111	3D Illustration. \$179.
X-Change	Sun, Ultrix, HP-UX, RS6000, X-terminals	InterCAP Graphic Systems 410-224-2926	Graphics data conversion: IGES, CGM, Interleaf and 12 other common formats. \$5000.

Template List

Tool	Platform	Vendor	Comments/Classification
DocTemplates	UNIX, IBM PCs & compatibles, Mac	ATA Inc. 310-316-6350	Interleaf and FrameMaker templates for 2167A, 7935A, 2168, 1521, 973, and IEEE. Price: Single User \$200 to \$1,200; Multi- users, contact Vendor.
PFS:First Publisher Templates	MS-DOS	Spinnaker Software. 800-826-0706	Templates. Price: Contact Vendor.

Text Processor/Batch Compiler List

Tool	Platform	Vendor	Comments/Classification
DECpage	VMS	Digital Equipment Corp. 800-344-4825	Using WPS-Plus documents as input, high quality text and graphics are produced; creates toc, lists of figures. Price: Contact Vendor.
Documentor's Workbench	UNIX	NCR 513-445-3232	Troff-based formatter/text processor for large documents and complex formatting. \$500 - \$4200.
Eroff (EDWB)	MS-DOS, UNIX,Domain, Sun	Elan Computer Group Inc. 415-964-2200	Text formatter. Enhances UNIX markup language, troff. Publishes medium to large documents. Combines graphics, tables, equations. Price: \$695 to \$5,000
SoftQuad Publishing	UNIX, MS-DOS	SoftQuad Inc. 416-239-4801	Text and graphics formatter for large documents and complex formatting; enhanced version of Documentors Workbench. Price: \$1,850.
TEX Full System	UNIX	ArborText Inc. 313-996-3566 ext. 25	Typesetting and composition language; technical documents. Price: \$1,000/user; maintenance recommended but optional.
WordMARC	Sun, HP, UNIX, RS6000	MARC Software International 800-835-2400	Document processing; technical documents. \$250 - \$500 per seat.
Xpage	UNIX	Image Network 408-336-5838	UNIX troff for laser printers from X Windows. Also for Fax, scanners and imaging devices. \$20% of Xroff price.
Xroff	UNIX	Image Network 408-336-5838	Superset of Documentor's Workbench (text processor of large documents and complex formatting). \$3625

Word Processor List

Tool	Platform	Vendor	Comments/Classification
Ami Pro for Windows	Windows	Lotus Word Processing Div. 800-926-4874	WYSIWYG word processor. \$268.
BOS Office Pack	MS-DOS, VMS,UNIX, Novell	BOS National Inc. 214-956-7722	Character-based word processor with database and spreadsheet; connectivity. \$1350 for single user. \$5400 for 25 - 39 users.
BOS Writer	MS-DOS, VMS,UNIX, Sun,	BOS National Inc. 214-956-7722	Word processor, connectivity. \$450 for single user. \$1800 for 25 - 30 users.
CA-Textor	Windows, OS/2	Computer Associates 800-CALL-CAI	WYSIWYG word processor. \$79.
CCWORD	RTE HP1000	Interactive Computer Technology 612-770-3728	Word processor to give HP terminals the capabilities of a dedicated word processor. \$3500.
CliqWord	MS-DOS, UNIX, Sun	Quadratron Systems Inc. 818-865-6655	Word processor. \$495.
Contact Plus Personal	MS-DOS	Contact Plus Corp. 800-366-9876	Contact manager with word processor. \$99.
Contact Plus Professional	MS-DOS	Contact Plus Corp. 800-366-9876	Contact manager with word processor. Stand alone \$295, network \$595 - \$2,695.
Crystal Document Management System	MS-DOS, UNIX	Syntactics 408-727-6400	Document format database and library, integrated record manager, document assembly tools. Open architecture, integration hooks facilitate automatic doc production from database applications. DOS \$445, UNIX \$995.
Crystal Writer Plus	MS-DOS, UNIX	Syntactics 408-727-6400	Word processor with object-oriented automatic formatting, integrated spell corrector, macros, mail merge, and file manager/records editor. DOS \$200, UNIX \$695.
DECwrite	Windows, OS/2, VMS, Ulrix	Digital Equipment Corp. 800-343-4040	WYSIWYG word processor with DTP features. \$695.
Describe	Windows, OS/2	Describe Inc. 916-646-1111	WYSIWYG word processor with DTP features. Stand alone \$495. Network version available.
EdWord	VM/CMS, MVS/ CICS	Trax Software Inc. 800-367-8729	Word processor. 10 seats \$7,750.
Enable OA	MS-DOS, OS/2	Enable Software Inc. 800-888-0684	Integrated package with word processor. \$795 - \$2,795.
Express Publisher	MS-DOS	Power Up Software Corp. 800-851-2917	Word processor with DTP features; GUI. \$80.
Express Publisher for Windows	Windows	Power Up Software 800-851-2917	Word processor with DTP features. \$80.
Framework 4	MS-DOS	Borland International 800-331-0877	Integrated package with word processor. \$695.
Full Write Professional	Mac	Akimbo Systems 617-776-5500	Word processor with DTP features. \$392.
GOLDMEDAL Elite	MS-DOS, UNIX	Decathlon Data Systems Inc. 303-440-9000	Integrated package with word processor. DOS \$495, UNIX \$695, four user UNIX \$1495.
GrandView	MS-DOS	Symantec Corp. 800-441-7234	Outliner/word processor, project manager, front end to presentation graphics. \$99
InWord	MS-DOS	Funk Software Inc. 800-822-3865	Word processor that runs inside Lotus 1-2-3. \$100.
LetterPerfect	MS-DOS	WordPerfect Corp. 800-451-5151	Word processor. \$149. Additional license \$89.
Macwrite Pro	Mac	Clarix Corp. 800-3CLARIS	Word processor with DTP features. \$249.

Appendix B: Documentation Product Lists

Word Processor List

Tool	Platform	Vendor	Comments/Classification
MASS-11	MS-DOS, VMS	Microsystems Engineering Corp. 817-536-2623	Multi-platform technical publication package, powerful document processor. \$495 - \$24,000.
Microsoft Office	Windows	Microsoft Corporation 800-227-4679	Integrated package including Word for Windows, Power Point(presentation graphics), Excel (spreadsheet), e-mail. \$750.
Microsoft Publisher	Windows	Microsoft Corporation 800-227-4679	Word processor with DTP features. \$139.
Microsoft Word	MS-DOS, OS/2, Mac	Microsoft Corporation 800-227-4679	Word processor with DTP features. Price \$495
Microsoft Word for Windows	Windows	Microsoft Corporation 800-227-4679	Word processor with DTP features. Price \$495
Microsoft Works	MS-DOS, Windows, Mac	Microsoft Corporation 800-227-4679	Integrated package including word processor, spread sheet, presentation graphics and on PCs, communication or drawing. \$149 - \$295
More	Mac	Symantec Corp. 800-441-7234	Outliner/word processor, templates, front end to presentation graphics. \$395
Multimate	MS-DOS	Borland International 408-438-8298	WYSIWYG word processor with DTP features. \$495.
Nisus	Mac System 7	Nisus Software 800-922-2993	WYSIWYG word processor with DTP features. \$395 - \$495.
Nota Bene	MS-DOS	Xyquest 410-576-2040	Word processor for scholars and academics; multi-lingual. \$179
OfficeWriter	MS-DOS	Software Publishing Corp. 408-986-8000	Word processor with DTP features. \$495.
Open Access 4	MS-DOS	Software Products International 619-450-1526	Integrated package; word processor, connectivity \$595
Open Office Power	Sun	ICL Inc. 415-459-3676	Integrated package including word processor, graphics, conversion. \$500.
PC Write	MS-DOS	Starlight Software 206-437-2650	Word processor. Price: Contact Vendor.
Primary Editor Plus	MS-DOS	IBM Corp. 800-426-3327 800-333-6705 (Fed. Systems)	Word processor designed for elementary school students. Purchase must be made by a school.
Professional Write	MS-DOS	Software Publishing Corp. 408-986-8000	Word processor with DTP features. \$249.
Professional Write Plus	Windows	Software Publishing Corp. 408-986-8000	WYSIWYG word processor with DTP features. \$249.
Publish-It Lite	MS-DOS	Timeworks 708-559-1300	Low end WYSIWYG word processor with DTP features. \$60.
Publish-It!	MS-DOS, Windows	Timeworks 708-559-1300	WYSIWYG word processor with DTP features. \$150.
Q & A Write	MS-DOS, Windows	Symantec Corp. 800-441-7234	Word processor replacing Justwrite. \$70
Q Text II	VMS, VAX, MS-DOS, RSX, RT11, TSX	ECAP Systems Inc. 613-764-3889	Word processor; connectivity, efficient use of mainframe resources. \$50 - \$10,000.
QED Office	MS-DOS	Strategy Marketing Associates 310-378-7632	Office automation including document creation. \$149 single user, \$1495 for 20 users.
QS	MS-DOS	Dilworth Software Inc. 408-624-6500	Word processor; WordStar 4.0 compatible. \$395.

Word Processor List

Tool	Platform	Vendor	Comments/Classification
QuickLetter	Mac	Working Software Inc. 408-423-5696	Letter and memo writing tool. \$50.
R O Plus	MS-DOS, UNIX	RSYS Inc. 214-343-9210	Office automation including word processing. \$595.
R W	MS-DOS, UNIX	RSYS Inc. 214-343-9210	Word processor. \$375.
R W Plus	MS-DOS, UNIX	RSYS Inc. 214-343-9210	Word processing and database. \$495.
Ready, Set, Go!	Mac	Manhattan Graphics Software 800-572-6533	Word processor with DTP features. \$395.
SAS System	MS-DOS, OS/2, MVS, CMF, VMS, UNIX	SAS Institute 919-677-8000	Integrated package including SAS/FSP. \$940 - \$50,000.
SAS/FSP	MS-DOS, OS/2, MVS, CMF, VMS, UNIX	SAS Institute 919-677-8000	Word processor. \$730 - \$33,580.
SmartWare II	MS-DOS, UNIX	Angoss Software International 416-593-1122	Integrated package with word processor. \$689.
Surefire	MS-DOS	Public Brand Software 800-426-3475	Word processor that lets you build databases and spreadsheets within your documents. \$29 - \$69.
Symphony	MS-DOS	Lotus Development Corp. 800-926-4874	Integrated package with word processor. Price: Stand alone \$599, Server \$609
Textra	MS-DOS	Ann Arbor Software 313-769-9088	Word processor with DTP features. \$95.
The Universal Word	MS-DOS, Windows	WYSIWYG Corp. 310-575-1991	WYSIWYG word processor, multi-lingual. \$295 to \$495 depending on languages.
Thoroughbred Word	MS-DOS, VMS, UNIX, Novell	Concept Omega Corp. 908-560-1377	Word processor, connectivity. 800-524-0430 for pricing.
Uniplex Business Software	MS-DOS, UNIX, Sun	Uniplex Integration Systems Inc 214-717-0068	UNIX based, integrated office software including word processing, spreadsheet, personal database, hooks to popular 3rd party databases, electronic mail and group calendaring. \$260/seat
Writer	MS-DOS	Atex Publishing Systems 617-275-2323, 800-433-2839	Word processor with multiple windows and communications functions. \$695
Xywrite	MS-DOS, Windows	Xyquest 410-576-2040	Word Processor. \$495
Word-11	VMS (VAXstation)	Data Processing Design 714-974-1515	Word processor. \$995 - \$20,000.
Word-11 PC	MS-DOS	Data Processing Design 714-974-1515	Word processor. \$295.
Wordmaker	Mac	New Horizons Software 512-328-6650	Entry level word processor. \$75.
WordPerfect 3.0	Mac	WordPerfect Corp. 800-451-5151	Word processor with DTP features. \$495.
WordPerfect 5.0	MS-DOS, UNIX, Sun	WordPerfect Corp. 800-451-5151	Word processor with DTP features. \$495 single license; upgrade is \$99.
WordPerfect 5.1	MS-DOS, UNIX, Sun, VMS	WordPerfect Corp. 800-451-5151	Word processor with DTP features. \$495 single license, additional licenses \$349 or \$295 w/o documentation. Single license upgrade \$129.
WordPerfect for Windows 6.0	Windows	WordPerfect Corp. 800-451-5151	Word processor with DTP features \$495 single license, upgrade \$129, competitive tradeup \$149.

Appendix B: Documentation Product Lists

Word Processor List

Tool	Platform	Vendor	Comments/Classification
WordPerfect Works	MS-DOS	WordPerfect Corp. 800-451-5151	Integrated package with LetterPerfect, flat file database, graphics editor, communications package, spreadsheet. \$159 single user, additional license \$95 w/o documentation.
Wordstar 7.0	MS-DOS	WordStar International Inc. 800-227-5609	Word processor with DTP features. \$299
Wordstar for Windows	Windows	WordStar International Inc. 800-227-5609	WYSIWYG word processor with DTP features. \$100
WriteNow	Mac	WordStar International Inc. 800-227-5609	Word processor. \$120.

Workflow List

Tool	Platform	Vendor	Comments/Classification
InConcert	Sun, RS6000, MS-DOS(client only)	XSoft 800-428-2995	Document-based workflow management software. 1 server, 2 developer licenses, and 8 user licenses \$21,000.
Keyfile	OS/2, Windows	Keyfile Corporation 603-883-3800	Filing, retrieving, sharing and distributing documents. Allows access to documents via their native application. Incorporates workflow into document management. Price: Single User \$995;
Lotus Notes	MS-DOS	Lotus Development Corp. 800-926-4874	Workgroup software; send mail, distribute documents. Price: \$400/seat.
Microsoft Works For Windows	Windows	Microsoft Corporation 800-227-4679	Integrated package including word processor, spread sheet, presentation graphics, and on PCs, communication or drawing. Price: \$295
Optix Workflow Software	Mac	Blueridge Technologies 703-675-3015	Document imaging, text search, OCR, archival/retrieval, Fax server, allows documents to be moved along a routing path. \$60,000 and up.
Rapport	HP-UX, Ultrix, SunOS, SGI, Solaris	Clarity Software Inc. 800-235-6736, 703-934-6121	Word processing, spreadsheet, e-mail, presentation graphics. \$895/seat. \$150/seat annual maintenance.

Workgroup List

Tool	Platform	Vendor	Comments/Classification
A1- Access	MS-DOS, VAX, Mac, Windows	ECAP Systems Inc. 613-764-3889	Integrates WordPerfect PC-DOS and ALL-IN-1. \$49 - \$150 per user. (15 user minimum)
ALL-IN-1	VMS, MS-DOS, Mac	Digital Equipment Corp. 800-344-4825	Includes WPS Plus with office automation options
Applixware formerly Asterix	UNIX, Sun, HP, Alpha	Applix, Inc. 703-734-3330	Workgroup, compound documents, engineering, database \$700 - 1500
BOS Office Pack	MS-DOS, VMS, UNIX, Novell	BOS National Inc. 214-956-7722	Character-based word processor with database and spreadsheet; connectivity. \$1350 for single user. \$5400 for 25 - 39 users.
BOS Writer	MS-DOS, VMS, UNIX, Sun,	BOS National Inc. 214-956-7722	Word processor; connectivity. \$450 for single user. \$1800 for 25 - 30 users.
CliqAccessories	UNIX, Sun	Quadratron Systems 818-865-6655	Phonebook, scheduler, e-mail., notepad, calculator. Price: Hardware dependent, contact Vendor.
CONNECT	HP1000	Interactive Computer Technology 612-770-3728	Connectivity. \$750
Crystal Document Management System	MS-DOS, UNIX	Syntactics 408-727-6400	Document format database and library, integrated record manager, document assembly tools. Open architecture, integration hooks facilitate automatic doc production from database applications. DOS \$445, UNIX \$995.
GeoWorks Ensemble	MS-DOS	Geoworks Inc. 510-644-0883	Word processor, draw, communications. Price: Contact Vendor.
ImageMover	Wang VS, VMS, Ultrix, RS6000, Sun	Information Management Consultants Inc. 703-893-3100	Application programs interface consisting of procedures which developers use to implement workflow mgmt. in an application. Price: Start with 4 users for \$10,000. Additional users are \$1,750/user.
Microsoft Office	Windows	Microsoft Corporation 800-227-4679	Integrated package including Word for Windows, Power Point(presentation graphics), Excel (spreadsheet), e-mail. Price: Contact Vendor.
Microsoft Works For Windows	Windows	Microsoft Corporation 800-227-4679	Integrated package including word processor. Price: Contact Vendor.
Open ODMS	All servers supported by Sybase, Oracle, RDB. clients: Mac, Windows, Motif	Odesta Systems Corp. 708-498-5615	Client-server application for workflow and document management supports entering, storing, retrieving, routing and distributing documents. Servers \$10,000 up; client seats \$1500.
Open Access	MS-DOS	Software Products International 619-450-1526	Integrated package; word processor, connectivity. \$595.
onGO Write Paint & Draw and onGO Office	Clients: Windows, X Windows Servers: UNIX	Uniplex Integration Systems Inc. 703-821-5542	Modular software components for enterprise information management. Native X.400 mail agent with wide area network support. Write Paint & Draw \$295/seat. onGO Office server \$240/seat; client \$70/seat.
Q Text II	VMS, VAX, MS-DOS, RSX, RT11,	ECAP Systems Inc. 613-764-3889	Word processor; connectivity, efficient use of mainframe resources. \$50 - \$10,000.
GOLDMEDAL WorkGroup	UNIX, Sun	Decathlon Data Systems 303-440-9000	Office applications to facilitate group communications and scheduling activities. \$395, four users \$1900.
Thoroughbred Word	MS-DOS, VMS, UNIX, Novell	Concept Omega Corp. 908-560-1377	Word processor, connectivity. 800-524-0430 for pricing.
Uniplex Business Software	MS-DOS, UNIX, Sun	Uniplex Integration Systems Inc 703-821-5542	UNIX based, integrated office software including word processing, spreadsheet, personal database, hooks to popular 3rd party databases, electronic mail and group calendaring. \$250/seat
WordPerfect Office for PC LANs	NETBIOS compatible network	WordPerfect Corp. 800-451-5151	E-mail and scheduler programs with six desktop organization programs: shell, calendar, calculator, notebook, file manager, etc. \$495 single server with 5 mailboxes.

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Appendix C:

Product Sheets

PRODUCT SHEET - REPORT

ADEPT-EDITOR

Subdomain: Desktop Publishing
Product: ADEPT-Editor

Version Number: 5.0
Date of Last Release: 9/93
Date of First Release: 1989
Frequency of Updates: 3-6 Mo
Number Sold:

Vendor: ArborText, Inc.

In Business Since: 1982
Address: 1000 Victors Way
Suite 400
Ann Arbor, MI 48108

Marketing Contact: Elizabeth Richardson
Phone Number: 313-996-3566, X1052
FAX Number: 313-996-3573
E-Mail Address: ehr@arbortext.com

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support: 313-996-3566

Pricing:

Single User Price: Contact Vendor
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Platform(s)/Operating System(s):

ADEPT-Editor is available on most UNIX systems including Sun Sparcstations; HP 9000 Series; DEC 2100, 3100, and 5000; IBM RS/6000; and SGI IRIS platforms. ADEPT-Editor is also available on Solaris' 2.X PC system.

Description/Purpose:

ADEPT-Editor is an SGML-based document publishing system for on-line documents. ADEPT-Editor, is authoring-editing software for creating, viewing, and distributing on-line documents. It's a structured documentation system that allows you to create large and complex technical documents with integrated graphics, tables, and equations.

Because it creates and stores information in SGML, ADEPT-Editor facilitates entry, access, update, and reuse of information. This CALS-compliant software lets you work with any document type definition (DTD), so your document options are not limited.

ADEPT-Editor's programming language allows applications to be customized for specific workflow needs. Keyboard mappings and menus may be tailored to individual or workgroup requirements.

Productivity building applications including Interactive Electronic Technical Manuals (IETMs), Electronic Review, Intelligent Forms and Active Documents all start with ADEPT-Editor.

PRODUCT SHEET - REPORT

ADEPT-Publisher

Subdomain: Desktop Publishing
Product: ADEPT-Publisher

Version Number: 5.0
Date of Last Release: 9/93
Date of First Release: 1989
Frequency of Updates: 3-6 Mo
Number Sold:

Pricing:

Single User Price: Contact Vendor
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Vendor: ArborText, Inc.

In Business Since: 1982
Address: 1000 Victors Way
Suite 400
Ann Arbor, MI 48108

Marketing Contact: Elizabeth Richardson
Phone Number: 313-996-3566, X1052
FAX Number: 313-996-3573
E-Mail Address: ehr@arbortext.com

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support: 313-996-3566

Platform(s)/Operating System(s):

ADEPT-Publisher is available on most UNIX systems including Sun Sparcstations; HP 9000 Series; DEC 2100, 3100, and 5000; IBM RS/6000; and SGI IRIS platforms. ADEPT-Publisher is also available on Solaris' 2.X PC system. ADEPT-Publisher is an SGML-based document publishing system.

Description/Purpose:

ADEPT-Publisher, ArborText's, CALS-compliant authoring-editing-composition software helps organizations create automated technical documentation systems. Because ADEPT-Publisher creates and stores information in SGML, organizations may access, update, and reuse information.

ADEPT-Publisher can apply alternate layouts to the same text without modifying or rekeying the document content. Authors use ADEPT-Publisher to create books, manuals, and other large and complex documents, integrating text, graphics, equations, and tables.

With ADEPT-Publisher's programming language, applications can be customized to an organization's workflow needs. Keyboard mappings and menus are tailorable.

ADEPT-Publisher's most popular productivity-building applications include Interactive Electronic Technical Manuals (IETMs), Electronic Review, Intelligent Forms, and Active Documents.

PRODUCT SHEET - REPORT

ADW/DOC

Subdomain: Miscellaneous
Product: ADW/DOC

Version Number: 2.7
Date of Last Release:
Date of First Release: 6/91
Frequency of Updates: Annually
Number Sold: 5,000+

Pricing:

Single User Price: \$10,750
Site License: n/a
Multi-Copy Price:
20-39 copies \$7,100
75+ copies \$4,050

GSA Price: n/a
Maint. Price: 5.9% or 12% of
single copy
license fee

Vendor: KnowledgeWare, Inc.

In Business Since: 1986
Address: 3340 Peachtree Rd., NE
Atlanta, GA 30326

Marketing Contact: Denise Van Dyne
Phone Number: (404) 231-8575
FAX Number: (404) 364-0522
E-Mail Address:

Technical Contact:
Phone Number:

FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support: 1-800-344-2662

Platform(s)/Operating System(s):

OS/2, extended or standard edition, release - 1.3 or higher. (Release 2.0 is highly recommended.)

Description/Purpose:

ADW/DOC provides a vehicle for accessing, managing, and consolidating information that is captured in the ADW Encyclopedia. The product allows ADW users to combine encyclopedia information with externally developed text or graphics files to produce accurate project documentation at every stage of the development lifecycle.

ADW/DOC is designed to be used in conjunction with the ADW Planning, Analysis, Design, Construction MVS and RAD Workstations. The product facilitates and enhances the management, production, and tracking of deliverables for the entire development lifecycle. ADW/DOC provide a framework which can guide ADW users through the development project, help them to produce procedural guidelines, outline methods or enforce project or industry-wide standards. The product provides a means of quickly accessing all ADW tools, providing the user the capability to efficiently manage the information flow associated with application development.

PRODUCT SHEET - REPORT

APPLIXWARE

Subdomain: Desktop
Publisher/Workgroup
Product: APPLIXWARE

Version Number: 3.0
Date of Last Release: Dec. 1993
Date of First Release: 1990
Frequency of Updates: 6 Mo.
Number Sold: 250,000

Pricing:

Single User Price: \$451.75
Site License: Negotiable
Multi-Copy Price: Negotiable

GSA Price: 25% Discount
Maint. Price: 15% list price

Vendor: Applix, Inc.

In Business Since: 1983
Address: 8075 Leesburg Pike
Suite 740
Vienna, VA 22182

Marketing Contact: Bruce Corey
Phone Number: (703) 734-3330
FAX Number: (703) 734-8295
E-Mail Address:

Technical Contact:

Phone Number:
FAX Number:

E-Mail Address: bcorey@applix.com

Bulletin Board System:
Customer Support: (703) 734-3330

Platform(s)/Operating System(s):

SunOS 4.1.1 Sparc, HP RISC, IBM RS/6000, Sun 3, HP non-RISC, Macintosh, AUX, ISC, Silicon Graphics, DEC RISC, SCO, Data General, Univel, MIPS, Integrgraph, Motorola.

Description/Purpose:

Office integration software with word processing, graphics, spreadsheet, mail interfaces, and conversion utility (filter packs) applications; WYSIWYG in all applications. The software permits a common user interface among all native and foreign programs.

CDRL-GEN

Subdomain: Miscellaneous
Product: CDRL-GEN

Version Number: 2.1
Date of Last Release: 1990
Date of First Release: 1989

Frequency of Updates: As required
Number Sold: 300

Pricing:

Single User Price: \$195*
Site License: Negotiable
Multi-Copy Price: Negotiable

GSA Price: N/A
Maint. Price: N/A

*Considerably less when purchased
as part of a package consisting of
TAILOR/2167A, TAILOR/DIDs-2167A,
INSIGHT/2167A, CDRL-GEN.
Package price is \$499

Vendor: Logicon

In Business Since: 1962
Address: P.O. Box 81985
San Diego, CA
92138-1985

Marketing Contact: Cathy Meyer
Phone Number: (619) 458-9098
FAX Number: (619) 587-4781
E-Mail Address:

Technical Contact:

Phone Number:
FAX Number:

E-Mail Address:

Bulletin Board System:
Customer Support: (619) 458-9098

Platform(s)/Operating System(s):
IBM PC compatibles, DOS 3.0 or higher.

Description/Purpose:

Prompts the user with questions about a system or software development project. Identifies candidate deliverables, provides advice on which to select, and generates filled-in, on-line Contract Data Requirements List (CDRL) forms (DD Form 1423) for each deliverable. Also prepares AF Form 585. Provides advice on each block of the CDRL form. Supports on-line refinement of the CDRL forms. Checks consistency and completeness. Prints contract-ready CDRL forms. Accesses tailoring decisions made in TAILOR/DIDs-2167A and automatically enters appropriate tailoring instructions into Block 16 of the CDRL form. Saves many hours of work and gives more accurate results than are possible with manual CDRL preparation. In use throughout DoD and in other Federal agencies as well.

PRODUCT SHEET - REPORT

CliqForm

Subdomain: Form Generation
Product: CliqForm

Version Number: 1.1
Date of Last Release: 10/92
Date of First Release: 1989
Frequency of Updates: 18 Mo
Number Sold: Contact Vendor

Pricing:

Single User Price: Hardware
Dependent
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: 15% list price
annually

Vendor: Quadratron Systems

In Business Since: 1983
Address: 31368 Via Colinas
Suite 108
Westlake Village, CA
91362

Marketing Contact: Kathy Berg
Phone Number: (818) 865-6655
FAX Number: (818) 865-6644

E-Mail Address: kberg@quad.com

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (818) 865-6655

Platform(s)/Operating System(s):

IBM RS/6000; Digital (RISC Ultrix); MIPS; HP 9000/800 and HP 9000/700 (HP-UX); Motorola 68030, Motorola 88K; Sun SparcStation (Solaris); Pyramid (OSC and DC/OSX); AT&T 3B2; AT&T StarServer, DG AViiON, Harris Nitehawk, NCR 3000, Tower, Unisys; Sequent.

Description/Purpose:

Main features include: Utilization of multiple fonts and text attributes; scrollable/Wordwrap fields; built in database; precision placement by physical measurement; context sensitive help.

CliqForm is a form building tool and a database. The database can be linked to any number of forms. The database makes it possible to build applications with CliqForm. Drawing mode makes lines and box drawing possible.

PRODUCT SHEET - REPORT

CliqPage

Subdomain: Desktop Publishing
Product: CliqPage

Version Number: 1.1
Date of Last Release: 1991

Date of First Release: 1989
Frequency of Updates: 18 Mo
Number Sold: Contact Vendor

Pricing:

Single User Price: Contact Vendor
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: 15% list price

Vendor: Quadratron Systems

In Business Since: 1983
Address: 31368 Via Colinas
Suite 10
Westlake Village, CA

Marketing Contact: Kathy Berg
Phone Number: (818) 865-6655
FAX Number: (818) 865-6644
E-Mail Address: kberg@quad.com

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (818) 865-6655

Platform(s)/Operating System(s):

IBM RS/6000; Digital (RISC Ultrix); MIPS: HP 9000/800 and 700 (HP-UX); Motorola 68030; Motorola 88K, Sun Sparc Station; Pyramid: AT&T 3B2; AT&T Star Server; DG AViiON. Harris Nitehawk, NCR, Tower, NCR, Tower, NCR, 3000, Unisys, Sequent.

Description/Purpose:

Main features include: Utilizes CliqWord functions and features; line and box drawing, graphics integration; down-loadable fonts; and, context sensitive help.

The typesetting option provided by CliqPage allows expanded font support, character kerning, box shadowing, fill patterns and the ability to include graphics in a variety of formats. CliqPage supports graphics in PCX and TIF formats.

PRODUCT SHEET - REPORT

CliqWord

Subdomain: Word Processor Product: CliqWord Version Number: 120.0 Date of Last Release: 1993 Date of First Release: 1989 Frequency of Updates: 18 Mo Number Sold: Contact Vendor	Vendor: Quadratron Systems In Business Since: 1983 Address: 31368 Via Colinas Suite 10 Westlake Village, CA Marketing Contact: Kathy Berg Phone Number: (818) 865-6655 FAX Number: (818) 865-6644 E-Mail Address: kberg@quad.com Technical Contact: Phone Number: FAX Number: E-Mail Address: Bulletin Board System: n/a Customer Support: (818) 865-6655
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Pricing: Single User Price: Contact Vendor Site License: Contact Vendor Multi-Copy Price: Contact Vendor GSA Price: Contact Vendor Maint. Price: 15% list price

Platform(s)/Operating System(s):

IBM RS/6000; Digital (RISC Ultrix); MIPS: HP 9000/800 and HP 9000/700 (HP-UX); Motorola 68030; Motorola 88K, Sun Sparc Station; Pyramid: AT&T 3B2; AT&T Star Server; DG AViiON. Harris Nitehawk, NCR, Tower, NCR, Tower, NCR, 3000, Unisys, Sequent, MS-DOS.

Description/Purpose:

Main features include: X-Windows/Motif graphical user interface as well as character interface; thesaurus plus 80,000 word dictionary; SQL Query capability; line and box drawing; print from editor; table of contents and index generator; context sensitive help.

CliqWord is a word processor utilizing pop-up menus and dialogue boxes. It offers: copy, move, delete, case conversions, thesaurus, spell-checker and corrector, multiple columns.

In addition to basic word processing functions, CliqWord can draw lines and boxes, operate using physical measurement in inches, picas, and centimeters, and provides snaking columns, index generator, and table of contents generator. The Windowing feature allows viewing and editing of multiple documents simultaneously.

PRODUCT SHEET - REPORT

DECimage Scan

Subdomain: Scanning
Product: DECimage Scan

Version Number:
Date of Last Release:

Date of First Release:

Frequency of Updates:
Number Sold:

Vendor: Digital Equipment Corp.

In Business Since:
Address: Digital Drive
MKO1-2/E33
Merrimack, NH
03054-9501

Marketing Contact: Kathy Shea
Phone Number: 800-DIGITAL
FAX Number: (603) 884-1036
E-Mail Address:

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support (800) 354-9000

Pricing:

Single User Price: \$560
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: \$398
Maint. Price: Contact Vendor

Platform(s)/Operating System(s):

Open VMS, Unix, DEC image Scan software operates Digitals MD30C, MD400 and MD410 Image Scanners.

Description/Purpose:

Enables DECwindows workstation users to capture, display, adjust and file digitized image data.

Provides for display and adjustment of bitonal, gray scale, and RGB color images. Enables images to be transferred among application. Supports scanner sharing in network and VAXcluster environments.

PRODUCT SHEET - REPORT

DECwrite

Subdomain: Word Processing
Product: DECwrite

Version Number: 2.0

Date of Last Release:

Date of First Release:

Frequency of Updates:
Number Sold:

Vendor: Digital Equipment Corp.

In Business Since:

Address: Digital Drive
MKO1-2/E33
Merrimack, NH
03054-9501

Marketing Contact: Kathy Shea
Phone Number: 800-DIGITAL
FAX Number: (603) 884-1036
E-Mail Address:

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support (800) 354-9000

Pricing:

Single User Price: \$1,100 (MS
Windows \$695)

Site License:
Multi-Copy Price: Available

GSA Price: \$781
(MS Win. N/A)

Maint. Price: 22% annually
(MS Win. N/A)

Platform(s)/Operating System(s):

Digital VAXstation with either 8 MB (XUI interface) or 12 MB (DECwindows Motif Interface) of memory; or VAXstation display, VT1200 (min 4 MB) or VT1300 combined with a VAX server. Digital RISC ULTRIX workstation with 16 MB of memory; or DECstation display (11 MB), VT1200 (minimum of 4 MB) or VT1300 combined with a DECsystem server. Sun SPARCstation requires 16 MB of memory. Any 80386 or 80486 pc with minimum of 4 MB of memory.

Open VMS Operating system V5.3-1 (w/VMS DECwindows) or V5.4 (w/DECwindows Motif V1.0), ULTRIX Workstation software V4.0-4.2 and ULTRIX DECwindows, SunOS V4.1.1 Open Windows V2.0 or MIT X11R4 or DECwindows for Sun SPARCstation V3.0, MS-DOS V3.3 or higher and MS Windows V3.0.

Description/Purpose:

DECwrite integrates WYSIWYG desktop publishing, word-processing, business graphics, drawing tools and equation editing into one package. Allows publishing from conception to camera-ready mechanicals, for documents like technical manuals, business proposals, research reports, and magazine-style product data sheets.

DECwrite documents can be shared across OpenVMS, ULTRIX, Sun SPARCstation, and Microsoft Windows - with no conversion.

DECwrite is available in several languages, and you can mix languages in the same document.

PRODUCT SHEET - REPORT

Doc_Template

Subdomain: Templates
Product: Doc_Template

Version Number: 1.1
Date of Last Release: 9/93

Date of First Release: 1/93
Frequency of Updates: 4-6 Mo
Number Sold: 5

Pricing:

Single User Price: \$200 - \$1,200
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: None
Maint. Price: N/A

Vendor: ATA, Inc.

In Business Since: 1988
Address: 3528 Torrance Blvd.,
Suite 214
Torrance, CA 90503

Marketing Contact: Alexander J. Polack
Phone Number: (310) 316-6350
FAX Number: (310) 316-3982
E-Mail Address:
71201.2045@compuserve.com

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (310) 316-6350

Platform(s)/Operating System(s):

All Unix Platforms, IBM PCs and their compatibles, and MacIntosh.

Description/Purpose:

Doc_Templates is a set of document templates for the Data Items of the major DOD, MIL, IEEE and ISO system and software development standards. The templates fully comply with the structure, format, and style requirements of the applicable standards. The templates are provided in FrameMaker and Interleaf formats.

PRODUCT SHEET - REPORT

DocEXPRESS

Subdomain: Desktop Publishing
Product: DocEXPRESS

Version Number: 2.0
Date of Last Release: 10/93

Date of First Release: 1/91
Frequency of Updates: 4-6 Mo
Number Sold: 82

Pricing:

Single User Price: \$7,500
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: None
Maint. Price: \$1,500

Vendor: ATA, Inc.

In Business Since: 1988
Address: 3528 Torrance Blvd.
Suite 214
Torrance, CA 90503

Marketing Contact: Alexander J. Polack
Phone Number: (310) 316-6350
FAX Number: (310) 316-3982
E-Mail Address:
71201.2045@compuserve.com

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (310) 316-6350

Platform(s)/Operating System(s):
SunSPARC under Sun OS and Solaris

Description/Purpose:

DocEXPRESS automatically generates deliverable documents from information contained in the repositories of CASE tools and other databases. DocEXPRESS uses knowledge of the engineering methods, CASE tools, and standards to extract the engineering data and insert it into the appropriate document sections. Document templates are provided for major DOD, MIL, IEEE, and ISO standards. Additional templates may be defined by the user.

PRODUCT SHEET - REPORT

Document Architect

Subdomain: Desktop Publishing
Product: Document Architect

Version Number: 5.0
Date of Last Release: 9/93
Date of First Release: 1989
Frequency of Updates: 3-6 Mo
Number Sold:

Pricing:

Single User Price: Contact Vendor
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Vendor: ArborText, Inc.

In Business Since: 1982
Address: 1000 Victors Way
Suite 400
Ann Arbor, MI 48108

Marketing Contact: Elizabeth Richardson
Phone Number: 313-996-3566, X1052
FAX Number: 313-996-3573
E-Mail Address: ehr @ arbortext.com

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support: 313-996-3566

Platform(s)/Operating System(s):

CALS-compliant Document Architect is available on UNIX systems including Sun Sparcstations; HP 9000 Series; DEC 2100, 3100, and 5000; IBM RS/6000; and SGI IRIS platforms. Document Architect is also available on Solaris' 2.X PC systems.

Description/Purpose:

Document Architect is a software system that helps application developers create state-of-the-art publishing applications including Interactive Electronic Technical Manuals (IETMs), Electronic Review, Intelligent Forms, and Active Documents.

Document Architect streamlines the authoring process, customizing the user-interface to minimize the SGML knowledge required of users.

Document Architect also writes, compiles, and tests user-defined Document Type Definitions (DTDs) and Formatting Output Specification Instances (FOSIs) so organizations are not limited to vendor-designed documents.

DTDs and FOSIs are automatically installed in ADEPT-Publisher and ADEPT-Editor, saving the costs associated with manually programming new DTDs and FOSIs into the system.

PRODUCT SHEET - REPORT

EROFF (TM)

Subdomain: Text processor/batch
compiler

Product: EROFF (TM)

Version Number: 3.1
Date of Last Release: 10/91
Date of First Release: 1985
Frequency of Updates:
Number Sold: 10,000+

Vendor: Elan Computer Group, Inc.

In Business Since: 1985
Address: 888 Villa Street
3rd Floor
Mt. View, CA 94041

Marketing Contact: Bob Taylor
Phone Number: 415-964-2200
FAX Number: 415-964-8588
E-Mail Address: bob@elan.com

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support: Lynn Gazis

Pricing:

Single User Price: Contact Vendor
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Platform(s)/Operating System(s):

Altos, AT&T/6300+, AT&T/7300/3B1, IBM PC MS-DOS, Macintosh A/UX, Microport (80286 CPU) UNIX 386, Xenix (8086/286 CPU), Xenix 386, Apollo Domain/IX, AT&T 382, Convergent, Counterpoint, DEC Micro VAX Ultrix/4.XBSD, HP-9000, Masscomp 5500/5600, NCR Tower, Sun 2,3,4 and 386i. AT&T/385,15,20 Ahldahl/UTS, DEC, VAX, Plexus, Pyramid, Sequent, Balance, and Symmetry.

Description/Purpose:

EROFF is a ditroff based typesetting system for the Hewlett-Packard LaserJet family, PostScript printers, including the Apple Laser Writer. EROFF features include: Choice between landscape and portrait printing. Two-up printing, two pages printed side-by-side on a single piece of paper. Image, Elan's facility to insert bit map graphics into your troff documents. Support for printer resident fonts, font cartridges and down loaded fonts. Kerning for proportionally spaced text. Support for foreign characters. Grap, for inserting plots and graphs into troff documents. Tools for creating subject indexes, ndx, subject and ptx.

PRODUCT SHEET - REPORT

FastTag

Subdomain: Filter/Translator
Product: FastTag

Version Number: 1.2.0.3
Date of Last Release: 1993
Date of First Release: 1986
Frequency of Updates: 2/Year
Number Sold: 497

Pricing:

Single User Price: DOS \$2,700.00
Other \$3,100.00
Site License: Contact Vendor
Multi-Copy Price: Qty Discount/
Contact Vendor
GSA Price: Discount avail/
Contact Vendor
Maint. Price: Contact Vendor

Vendor: Avalanche Development Company

In Business Since: 1985
Address: 947 Walnut Street
Boulder, CO 80302

Marketing Contact: John Payne
Phone Number: (303) 449-5032
FAX Number: (303) 449-3246
E-Mail Address: sales@avalanche.com

Technical Contact:
Phone Number:

FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (303) 449-5032

Platform(s)/Operating System(s):

DOS-IBM compatible 386 running DOS 4.0; Windows-IBM compatible 386 running DOS 4.0 and Windows 3.1; Sun-under Unix 4.1.x; Solaris-under Solaris 2.2 or SunOS 5.x; RS/6000-under AIX 3.2; DEC VAX under VMS Operating System 5.3 or ULTRIX 4.x; HP9000-under HP-UX 9.0x; SGI IRIS-under IRIX 4.X

Description/Purpose:

This automated markup software is used to move documents into SGML or other publishing environments. Supported inputs include Word for Windows, Word for Macintosh, WordPerfect, and formatted ASCII. Additional input formats are available with customization packages and include FrameMaker MIF files, Interleaf, and BookMaster. Standard output is SGML. Additional outputs are supported with the purchase of various add-on modules and include Interleaf, FrameMaker, WordPerfect, Word for Windows, BookMaster, Guide HML, and CALS SGML.

PRODUCT SHEET - REPORT

IMAGEWorks

Subdomain: Doc. Mgt. and
Workflow
Product: IMAGEWorks

Version Number: Set 3
(Set 4 announced: 1st shipment,
March 1994)
Date of Last Release: 3/93
Date of First Release: 10/90
Frequency of Updates: Annually
Number Sold: 160+

Pricing:

Single User Price: Contact Vendor
(Average about \$2000.00 per seat
for the EDMS software)
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Not currently
available
Maint. Price: Contact Vendor

Vendor: Bull HN Information Systems, Inc.

In Business Since: 1950

Address: 300 Concord Road
Billerica, MA 01821

Marketing Contact: Gerry Crow
Phone Number: (508) 294-6061
FAX Number: (508) 294-5290
E-Mail Address: Crow.G@ma30p.bull.com

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support:

Platform(s)/Operating System(s):

IMAGEWorks Product Suite modules; IMAGEWorks Classic, FlowPATH, StreamPATH, and ContentPATH, are all client/server modules. It supports a Unix server based on IBM's RS6000/AIX, or the DPX 20 which is Bull's private label version of the RS6000 as a primary platform. The primary client environment supported is DOS/MS-Windows.

Description/Purpose:

IMAGEWorks is a suite of integrated software modules for developing Electronic Document Management Solutions (EDMS) around which an organization can re-engineer their business processes. IMAGEWorks Classic is a comprehensive document storage and retrieval application environment built around file cabinets, file folders, and documents. Documents can be document images, fax, word processor native files, spreadsheet files, or voice data files. FlowPATH is a workflow development environment and includes a graphical flow editor called MOBILE Graphical Editor, a Windows-based tool which allows you to run simulations of the workflow environment quickly. ContentPATH is another specialized module for use in image-enabling existing applications such as database or transaction processing applications. All of these modules have APIs to extend and expand systems capabilities based on specific project requirements. Peripheral support is flexible with many devices previously integrated and tested. Optical devices can range from 5 1/4" to 12", scanners can be inexpensive desktop devices up to very high speed-type devices. Monitors can be standard VGA up to 19" high resolution color monitors, and decompression can be done through either software or various power add-in processor boards.

PRODUCT SHEET - REPORT

INSIGHT/2167A

Subdomain: Miscellaneous
Product: INSIGHT/2167A

Version Number: 1.0
Date of Last Release: 1990
Date of First Release: 1990

Frequency of Updates: As required
Number Sold: 300

Pricing:

Single User Price: \$99*
Site License: Negotiable
Multi-Copy Price: Negotiable

GSA Price: N/A
Maint. Price: N/A

*Considerably less when purchased
as part of a package consisting of
TAILOR/2167A, TAILOR/DIDs-2167A,
INSIGHT/2167A, CDRL-GEN.
Package price is \$499

Vendor: Logicon

In Business Since: 1962
Address: P.O. Box 81985
San Diego, CA
92138-1985

Marketing Contact: Cathy Meyer
Phone Number: (619) 458-9098
FAX Number: (619) 587-4781
E-Mail Address:

Technical Contact:

Phone Number:
FAX Number:

E-Mail Address:

Bulletin Board System:
Customer Support: (619) 458-9098

Platform(s)/Operating System(s):
IBM PC compatibles, DOS 3.0 or higher.

Description/Purpose:

On-line training tool for DoD-STD-2167A. Identifies and explains key concepts in DoD-STD-216A. Every explanation contains an illustration. Offers three levels of detail - overview, intermediate, and detailed - lets you pick the level of detail you need and want. Offers a Notes feature to let you make your own notes about each concept or paragraph in the standard. Offers optional quizzes to let you test your understanding of key concepts. Contains DoD-STD-2167A on-line with quick access to any paragraph. Offers an index feature to let you access all paragraphs on a given topic.

PRODUCT SHEET - REPORT

Interleaf 5<SGML>

Subdomain: Desktop Publishing
Product: Interleaf 5 <SGML>

Version Number: 1.1
Date of Last Release: 1993
Date of First Release: 1992
Frequency of Updates: 6 Mo.
Number Sold:

Pricing:

Single User Price: \$5,000
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Vendor: Interleaf Inc.

In Business Since: 1981
Address: Prospect Place
9 Hillside Avenue
Waltham, MA 02154

Marketing Contact: Interleaf direct
Phone Number: 800-955-5323
FAX Number: 617-290-4961
E-Mail Address: HQ.ileaf.COM

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: (Leafline)
617-290-4996
Customer Support: 800-688-5151

Platform(s)/Operating System(s):

DEC Ultrix, HP 700/HP-UX, IBM RS/6000/AIX, Sun-4, SunOS4, Solaris, DG-Aviion, DG/UX. The following X terminals: Tektronix, Digital Equipment VXT 2000, HP/Apollo, IBM Xstation, NCD, Visual Technologies, SGI. Digital Equipment MFX 2000.

Description/Purpose:

Interleaf 5 <SGML> is a combination of WYSIWYG and structural-view editing, providing native support of the international SGML standard for the Interchange of documents and data. Imports, maintains and exports SGML data, while interactively guiding the author in the creation of SGML documents.

Features of Interleaf 5 <SGML> includes: Guided SGML editor; DTD visualizer for displaying the underlying structure for users new to SGML; attribute editor for SGML applications; book assembly features for working with long documents; Open Graphics Library - TIFF and CGM import and export filters; and CALS application for working with documents according to the US DoD standard (Optional).

PRODUCT SHEET - REPORT

Interleaf 6 for Motif

Subdomain: Desktop Publishing
Product: Interleaf 6 for Motif

Version Number: 6.0
Date of Last Release: 1994
Date of First Release: 1983
Frequency of Updates: 6 Mo.
Number Sold: 250,000

Pricing:

Single User Price: \$2,500-\$12,200
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Vendor: Interleaf Inc.

In Business Since: 1981
Address: Prospect Place
9 Hillside Avenue
Waltham, MA 02154

Marketing Contact: Interleaf direct
Phone Number: 800-955-5323
FAX Number: 617-290-4961
E-Mail Address: HQ.leaf.COM

Technical Contact:

Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: (Leafline)
617-290-4996
Customer Support: 800-688-5151

Platform(s)/Operating System(s):

Sun OS, Sun-4: Solaris; DEC Alpha AXP: OSF1: HP 700/HP-UX; RS/6000, IBM/AIX, support for variety of hardware configurations via X window systems; including workstation, X-terminal, PC and MAC based display.

Planned for 1994: DG-UX, DEC open VMS; Motorola Unix V/88; Silicon Graphics IRIX. (Additional support) 386/486 Platform - class PCs under windows.

Description/Purpose:

Interleaf 6 provides document creation assembly and composition functionality including multi-lingual word processing, graphics tools, automated document layout and assembly, document management, work group tools and active document technology for specialized applications. Features include: templates, active on-line tutorial, on-screen help, customizable user interface, macros, spell checker, automatic numbering, search/replace, user-definable fonts, dictionary-style headers and footers; text shaping and rotation, zoom, turn pages, duplex margins, multiple columns, orphan/widow control, horizontal clip art, table of contents and index creation, A-paging, structured technical document production via book/catalog/loose-leaf capability, automatic cross-reference updates, change bars, tables equation editing, compatibility with many CASE tools, and close coupling with several CASE tool vendors.

PRODUCT SHEET - REPORT

Interleaf CALS Application

Subdomain: SGML/CALS
Product: Interleaf CALS
Application

Version Number: 1.1
Date of Last Release: 1993
Date of First Release: 1990
Frequency of Updates: 6 Mo.
Number Sold:

Pricing:

User Price: \$12,500
(Workgroup of up to 5
users at same site)
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Vendor: Interleaf Inc.

In Business Since: 1981
Address: Prospect Place
9 Hillside Avenue
Waltham, MA 02154

Marketing Contact: Interleaf direct
Phone Number: 800-955-5323
FAX Number: 617-290-4961
E-Mail Address: HQ.ileaf.COM

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: (Leafline)
617-290-4996
Customer Support: 800-688-5151

Platform(s)/Operating System(s):

Sun-4; Sun OS 4, Solaris; HP700/800 series: HP-UX; IBM RX/6000; AIX; DG AViiON; DG-UX, DEC:
Ultrix.

Description/Purpose:

The Interleaf CALS Application is an environment for creating and/or processing CALS documents and has been successfully tested by the CALS Test Network as CALS compliant. The CALS application supports all the CALS Phase I Standards: MIL-M-28001A SGML application for technical manuals; MIL-M 28000 IGES for Class I engineering drawings; MIL-M 28002 CCITT G4 for raster graphics; MIL-M 28003 CGM for technical illustrations; and MIL-STD 1840A ANSI tape for importing and exporting CALS files.

PRODUCT SHEET - REPORT

Interleaf Relational Document Manager

Subdomain: Document Management	Vendor: Interleaf Inc.
Product: Relational Document Manager (RDM)	
Version Number: 2.2	In Business Since: 1981
Date of Last Release: 1993	Address: Prospect Place
Date of First Release: 1989	9 Hillside Avenue
Frequency of Updates: 6 Mo.	Waltham, MA 02154
Number Sold: 125 sites est. (3,000 users worldwide)	
	Marketing Contact: Interleaf direct
	Phone Number: 800-955-5323
	FAX Number: 617-290-4961
	E-Mail Address: HQ.leaf.COM
Pricing:	
User Price: \$40,000 (Workgroup of 16 user licenses and one server license)	
Site License: Contact Vendor	Technical Contact:
Multi-Copy Price: Contact Vendor	Phone Number:
	FAX Number:
GSA Price: Contact Vendor	E-Mail Address:
Maint. Price: Contact Vendor	
	Bulletin Board System: (Leafline)
	617-290-4996
	Customer Support: 800-688-5151
Platform(s)/Operating System(s): HP 300/400/700/800 series; HP-UX; Sun-3; Sun-4; Sun OS 4, Solaris; IBM RS/6000; AIX; DEC; Ultrix, VMS; MS/Windows (client only); MS-DOS; Macintosh (Client only); Macintosh System 7.	
Description/Purpose: Interleaf RDM is a document and data management solution that provides integrated services for library management, workflow management, configuration management, and document assembly management. RDM is application-independent, supporting multiple data types including text, graphics, multi-media, and images. RDM is a client-server application with an open architecture. RDM supports multiple platforms and industry-standard graphical user interfaces.	

PRODUCT SHEET - REPORT

Interleaf WorldView

Subdomain: Electronic Distribution

Product: Interleaf WorldView

Version Number: 1.1
 Date of Last Release: 1993
 Date of First Release: 1989
 Frequency of Updates: 6 Mo.
 Number Sold: 2,500 site est.
 (500,000 users worldwide)

Pricing:

Single User Price: \$195
 \$10,000 (WorldView Press
 document Preparation tool)
 Site License: Contact Vendor
 Multi-Copy Price: Contact Vendor
 GSA Price: Contact Vendor
 Maint. Price: Contact Vendor

Vendor: Interleaf Inc.

In Business Since: 1981
 Address: Prospect Place
 9 Hillside Avenue
 Waltham, MA 02154

Marketing Contact: Interleaf direct
 Phone Number: 800-955-5323
 FAX Number: 617-290-4961
 E-Mail Address: HQ.ileaf.COM

Technical Contact:

Phone Number:
 FAX Number:
 E-Mail Address:

Bulletin Board System: (Leafline)
 617-290-4996
 Customer Support: 800-688-5151

Platform(s)/Operating System(s):

HP 300/400/700/800 series: HP-UX; HP Apollo DN4000, HP Apollo 425t: Domain OS; Sun-3, Sun-4:
 Sun OS 4, Solaris; IBM RS/6000; AIX; DG AViiON: DG-UX; DEC: Ultrix, VMS; 386/386 PCs:
 DOS and MS/Windows; Macintosh; Macintosh System 7; and IBM Mainframe (VM and CMS).

Description/Purpose:

Worldview combines electronic viewing with hypertext navigation and full-text retrieval. It accepts virtually any type of file from a wide variety of sources for distribution to thousands of users - over a network, on floppy disk or on CD-ROM (read-only memory compact disk) - for viewing on standard computers.

WorldView uses hypertext technology and electronic linking of information to provide navigation and access to information, with read-only display and local printing. Its functionality includes full-text retrieval across volumes of documents, copy-and-paste to other applications for information reuse, notes for electronic annotation and bookmarks. Because WorldView is part of the Interleaf document system solution, you can use Interleaf products to create and revise documents, to further tailor and automate WorldView and to manage your document process.

All the tools and functionality necessary for document preparation - index generation for full-text retrieval, tables of contents, autonumber and index token conversion to automatic hypertext links are included in the WorldView Press (the production tool). In addition, WorldView Press ensures that your collections comply with ISO 9660 standards, so your WorldView application can be platform-independent and can be used for distribution on CD-ROM.

PRODUCT SHEET - REPORT

Island Write, Draw & Paint

Subdomain: Desktop Publisher
Product: Island Write, Draw
& Paint, Presents,
Calc, and Equation

Version Number: 4.1
Date of Last Release: 1993
Date of First Release: 1988
Frequency of Updates: Biannually
Number Sold: 100,000

Pricing:

Single User Price: \$995
Site License:
Multi-Copy Price: \$4,495 - 5 pack
\$7,995 - 10 pack

GSA Price: \$781
Maint. Price: \$495 annually or
\$180 annually per
license with 5 or
more licenses.

Vendor: Island Graphics

In Business Since: 1981
Address: 4000 Civic Center Dr.
San Rafael, CA 94903

Marketing Contact: David Shelton
Phone Number: (800) 255-4499 ext 183
FAX Number: (415) 472-0335
E-Mail Address: dis@island.com

Technical Contact:

Phone Number:

FAX Number:
E-Mail Address:

Bulletin Board System n/a
Customer Support: (408) 720-0999

Platform(s)/Operating System(s):

Apollo Domain 10.2 or higher, Sun OS 4.0.3 or later, IBM AIX 3.2.HP, HP-UX 7.0 or higher, SOI IRIX 4D L 3.3.2 or higher, DEC ULTRIX 4.2, Sequent Dynix 1.1 or higher, Sun Motif, Sun Solaris 2.2 or higher.

Description/Purpose:

Island Write, Draw and Paint provides full-color word processing, desktop publishing, and illustration tools. Features include table and equation editors, macros and a thesaurus. Its import and export filters let users assemble text and graphics from a variety of sources into presentations and reports. Island Write Draw & Paint prints to PostScript. Color PostScript, and HP LaserJet and PaintJet printers.

PRODUCT SHEET - REPORT

M/Series Professional

Subdomain: Scanning
Product: M/Series Professional

Version Number:
Date of Last Release:
Date of First Release:
Frequency of Updates:
Number Sold:

Pricing:

Single User Price: \$1,695

Site License:
Multi-Copy Price:

GSA Price: Not sold direct
Maint. Price:

Vendor: Calera Recognition Systems

In Business Since: 1982
Address: 475 Potrero Avenue
Sunnyvale, CA 94086

Marketing Contact: Donna Valentino
Phone Number: (408) 720-8300
FAX Number:
E-Mail Address:

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (408) 720-0999

Platform(s)/Operating System(s):

Windows, PC/AT

*Required hardware: MM600 \$18,995 (600 characters/sec)
MM2400 \$37,995 (2400 characters/sec)

Description/Purpose:

OCR for high end users.

PRODUCT SHEET - REPORT

MASS-11 WP

Subdomain: Word Processing
Product: MASS-11 WP

Version Number: 8.6
Date of Last Release: 1992

Date of First Release: 5/75
Frequency of Updates: 6 Months
Number Sold: 5,000,000+

Pricing:

Single User Price: \$495 PC
Site License: Available
Multi-Copy Price: Available

GSA Price: Available
Maint. Price: Available @ 15%
of license

Vendor: Microsystems
Engineering Company

In Business Since: 1975
Address: 2500 Highlands Avenue
Suite 350
Lombard, IL 60148

Marketing Contact: Barbara Preston
Phone Number: (817) 536-2623
FAX Number: (817) 536-2623
E-Mail Address:

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: (708) 882-5682
Customer Support: (708) 261-0111

Platform(s)/Operating System(s):
MS-DOS, VAX/VMS

Description/Purpose:

MASS-11 WP is a document processor for VAX/VMS and the MS-DOS environment. It is a shared logic system, designed for group productivity. It offers technical features including scientific equation editing, footnotes, change bars and redlining. It supports PostScript, right-justified proportional spacing, multiple fonts and point size for desktop publishing, cross referencing, indexing, tables of contents and book building.

PRODUCT SHEET - REPORT

Microsoft Word

Subdomain: Word Processing
Product: MicrosoftWord

Version Number:
Date of Last Release:
Date of First Release:

Frequency of Updates: 12 to 18
Months

Number Sold:

Pricing:

Single User Price: \$495
Site License: N/A
Multi-Copy Price: \$425.00

GSA Price: Contact Vendor
Maint. Price:

Vendor: Microsoft Corporation

In Business Since:
Address: One Microsoft Way
Redmond, WA
98052-6393

Marketing Contact: Sales
Phone Number: (800) 426-9400
FAX Number: (206) 635-6100
E-Mail Address: N/A

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: (206) 936-6735
Customer Support: (206) 635-7200 (MAC)
(206) 635-7210 (DOS)
(206) 462-9673 (WIN)

Platform(s)/Operating System(s):

Macintosh 5.1, Microsoft Windows 6.0, MS-DOS 6.0

Description/Purpose:

A market leader in word processors. Easy to use. Graphical user interface. Mouse recommended.

PRODUCT SHEET - REPORT

SGML Hammer

Subdomain: Filter/Conversion
Product: SGML Hammer

Version Number: 1.0
Date of Last Release: 1992
Date of First Release: 1992
Frequency of Updates: Annually
Number Sold: 89

Pricing:

Single User Price: DOS \$1,500.00
Other \$2,100.00
Site License: Contact Vendor
Multi-Copy Price: Contact Vendor

GSA Price: Contact Vendor
Maint. Price: Contact Vendor

Vendor: Avalanche Development Company

In Business Since: 1985
Address: 947 Walnut Street
Boulder, CO 80302

Marketing Contact: John Payne
Phone Number: (303) 449-5032
FAX Number: (303) 449-3246
E-Mail Address: sales@avalanche.com

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System: n/a
Customer Support: (303) 449-5032

Platform(s)/Operating System(s):

DOS-IBM compatible 386 running DOS 4.0; Sun-under SunOS 4.0; SGI IRIS-under IRIX 4.x

Description/Purpose:

SGML Hammer translates SGML into various electronic publishing formats, performs SGML-to-SGML conversion, extracts information from SGML files for import into databases, and enhances SGML by adding comments and instructions for hypertext linking. With the addition of add-on modules, the SGML Hammer can convert SGML files to word processing or electronic publishing formats such as Frame, Interleaf, WordPerfect, and Word for Windows.

PRODUCT SHEET - REPORT

Sonar Professional

Subdomain: Document Management

Product: Sonar Professional

Version Number: 8.4 Mac
2.4 Windows
Date of Last Release: 8/93
Date of First Release: 12/87
Frequency of Updates: 6 Mo.
Number Sold:

Pricing:

Single User Price: \$795.00
Site License: Negotiable
Multi-Copy Price: 5 Pack: \$3,180

GSA Price:
Maint. Price:

Vendor: Virginia Systems, Inc.

In Business Since: 1984

Address: 5509 West Bay Court
Midlothian, VA 23112

Marketing Contact: Philip Van Cleave
Phone Number: (804) 739-3200
FAX Number: (804) 739-8376
E-Mail Address: VASYS (Applelink)

Technical Contact:
Phone Number:
FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support: (804) 739-3200

Platform(s)/Operating System(s):
Macintosh/Windows

Description/Purpose:

High-speed text retrieval systems, capable of searching 10,000 pages per second. Supports Boolean, proximity, wildcard, phonetic and synonym searches. Built in/user definable thesaurus. User definable concepts. Searches can be saved. Generates reports, finds words associated with a given subject and supports most word processor file formats. Free demo disk available. Also supports cross platform searching (Macintosh to Windows and vice versa).

PRODUCT SHEET - REPORT

SourceDoc

Subdomain: Extract from Source
Code

Product: SourceDoc

Version Number: 4.1
Date of Last Release: 7/91
Date of First Release: 11/88

Frequency of Updates: Annually
Number Sold: 3,000

Pricing:

Single User Price: \$345
Site License: \$235/10 Users
Multi-Copy Price: 15% discount for
30 users and up.

GSA Price:
Maint. Price:

Vendor: Intelligent Solutions, Inc.

In Business Since: 1988
Address: 9200 Park Avenue South
Bloomington MN 55420

Marketing Contact: Scott Kuehn
Phone Number: (612) 884-0200
FAX Number: (612) 884-5860
E-Mail Address:

Technical Contact:
Phone Number:

FAX Number:
E-Mail Address:

Bulletin Board System:
Customer Support (612) 884-0200

Platform(s)/Operating System(s):

MS-DOS, OS/2

Description/Purpose:

SourceDoc (formerly PolyDoc) a Hypertext Source Code Documentation System scans through source code extracting, creating and categorizing information on functions, classes, definitions, etc. It then stores this information in a database called a Project Documentation Library (PDL).

SourceDoc does this automatically without elaborate configuration setup. During code changes, SourceDoc will incrementally update the PDL as necessary.

Invoke SourceDoc's Hypertext Display/Search/Print engine from your editor to answer questions like: "What does this function do?", "Where is this function?", "What's the name of the class that...?", or "Are there similar functions?".

SourceDoc interfaces well with all Version Control Systems including: PVCS, RCS, and TLIB.

PRODUCT SHEET - REPORT

TAILOR/2167A

Subdomain: Miscellaneous
Product: TAILOR/2167A

Version Number: 2.2
Date of Last Release: 1990
Date of First Release: 1988

Frequency of Updates: As required
Number Sold: 2,000

Pricing:

Single User Price: \$195*
Site License: Negotiable
Multi-Copy Price: Negotiable

GSA Price: N/A
Maint. Price: N/A

*Considerably less when purchased
as part of a package consisting of
TAILOR/2167A, TAILOR/DIDs-2167A,
INSIGHT/2167A, CDRL-GEN.

Package price is \$499

Vendor: Logicon

In Business Since: 1962
Address: P.O. Box 81985
San Diego, CA
92138-1985

Marketing Contact: Cathy Meyer
Phone Number: (619) 458-9098
FAX Number: (619) 587-4781
E-Mail Address:

Technical Contact:

Phone Number:
FAX Number:

E-Mail Address:

Bulletin Board System:
Customer Support: (619) 458-9098

Platform(s)/Operating System(s):
IBM PC compatibles, DOS 3.0 or higher.

Description/Purpose:

Prompts the user with questions about a system or software development project and recommends appropriate tailoring of DoD-STD-2167A. Provides exact wording to be used in a Statement of Work. Provides a list of action items for completing the 2167A-related aspects of RFP or contract preparation. Checks consistency of tailoring decisions. Offers advice for tailoring decisions and tells what each paragraph of DoD-STD-2167A means. Saves many hours of work and gives more accurate results than are possible with manual tailoring. In use throughout DoD and in other Federal agencies as well.

PRODUCT SHEET - REPORT

TAILOR/DIDs-2167A

Subdomain: Miscellaneous
Product: TAILOR/
DIDs-2167A

Version Number: 1.0
Date of Last Release: 1990
Date of First Release: 1990

Frequency of Updates: As required
Number Sold: 2,000

Pricing:

Single User Price: \$195*
Site License: Negotiable
Multi-Copy Price: Negotiable

GSA Price: N/A
Maint. Price: N/A

*Considerably less when purchased
as part of a package consisting of
TAILOR/2167A, TAILOR/DIDs-2167A,
INSIGHT/2167A, CDRL-GEN.
Package price is \$499

Vendor: Logicon

In Business Since: 1962
Address: P.O. Box 81985
San Diego, CA
92138-1985

Marketing Contact: Cathy Meyer
Phone Number: (619) 458-9098
FAX Number: (619) 587-4781
E-Mail Address:

Technical Contact:

Phone Number:
FAX Number:

E-Mail Address:

Bulletin Board System:
Customer Support: (619) 458-9098

Platform(s)/Operating System(s):
IBM PC compatibles, DOS 3.0 or higher.

Description/Purpose:

Prompts the user with questions about a system or software development project and recommends appropriate tailoring of the DoD-STD-2167A Data Item Descriptions (DIDs). Provides exact wording to be used on the Contract Data Requirements List (CDRL) form for each 2167A deliverable. Also provides a tailored on-line template for each 2167A document to serve as a starting point for document preparation. Checks consistency of tailoring decisions along with DIDs and with tailoring decisions recorded in TAILOR/2167A. Offers advice for tailoring decisions and tells what each paragraph of the DIDs means. Saves many hours of work and gives more accurate results than are possible with manual tailoring. In use throughout DoD and in other Federal agencies as well.

Appendix D:

Product Critiques

PRODUCT CRITIQUE - REPORT

Product: Aster*x	Critique Author: TSgt. Grimaud
	Main Duties: Applications Maintenance
Vendor: Applix, Inc.	
Version: 2.1	Yrs. software experience: 10
Hardware platform: SunSPARC	Yrs. experience with tool: 1
Operating system: Sun OS, Version 4.1.3	Last time tool was used: Currently
Memory used:	Author considers self software: Programmer
Disk Space used:	
Enhancements:	

Environment of use:
Project description:
Produce documents using word processing, graphics and spreadsheet function.
Overall impression of this tool: Good.
Quality of vendor support: Unknown.

Notable strength(s) of the tool:
Very similar in word processing to Microsoft Word. The graphics package is very good.

Notable weakness(es) of the tool:
Not aware of any notable weaknesses, other than no filters loaded at our site.

Advice for potential buyers of this tool:
Ensure you purchase filters that will be needed to do file conversions.

PRODUCT CRITIQUE - REPORT

Product: Aster*x	Critique Author: James Bagley
Vendor: Applix, Inc.	Main Duties: Maintain Software
Version:	Yrs. software experience: 2
Hardware platform: SunSPARC	Yrs. experience with tool: 1.5
Operating system: Sun OS, Version 4.1.3	Last time tool was used: Currently
Memory used:	Author considers self software: Programmer
Disk Space used:	
Enhancements:	

Environment of use:
Project description: Software maintenance
Overall impression of this tool: Good
Quality of vendor support: Good

Notable strength(s) of the tool:
Ability to open several windows and link those windows. Ability to customize your environment.

Notable weakness(es) of the tool:
Cannot look at a large number of pages of data. This problem could be tied to the system and not Aster*x.

Advice for potential buyers of this tool:
Get <u>all</u> the licenses and filters.

PRODUCT CRITIQUE - REPORT

Product: Aster*x	Critique Author: Sgt. Patrick Clark
Vendor: Applix, Inc.	Main Duties: Maintain and update software documentation for two subsystems.
Version:	Yrs. software experience: 3
Hardware platform: SunSPARC	Yrs. experience with tool: 6 months
Operating system: Sun OS, Version 4.1.3	Last time tool was used: Currently
Memory used:	Author considers self software: Programmer
Disk Space used:	
Enhancements:	

Environment of use:
Project description:
Subsystem Documentation.
Overall impression of this tool: Good.
Quality of vendor support: Unknown.

Notable strength(s) of the tool:
Easy to use, once you become familiar with the functions. Very powerful. Allows you to handle nearly anything you need.

Notable weakness(es) of the tool:
Compared to Island Draw, Aster*x graphics are not as extensive. It takes longer to learn Aster*x. Adding a package of "pre-drawn" graphics would help with some graphics applications. Add the ability to erase portions of drawn graphics.

Advice for potential buyers of this tool:
This is a very practical package. Handles work requirements well.

Appendix D: Product Critiques

Product:	Aster*x	Critique Author:	Jill L. Featherstone
Vendor:	Applix, Inc.	Main Duties:	Software impact, design development and testing. Project point of contact for Aster*x.
Version:	2.0	Yrs. software experience:	10
Hardware platform:	SunSPARC	Yrs. experience with tool:	1.5
Operating system:	Unix - SunOS 4.1, 4.1.1, 4.1.3	Last time tool was used:	Currently
Memory used:	26 MB	Author considers self software:	Programmer
Disk Space used:			
Enhancements:			

Environment of use: Top-down software development 65 people on project.

Project description: Word processing, graphics and spreadsheets.

Overall impression of this tool: Good

Quality of vendor support: Excellent

Notable strength(s) of the tool:

Easy integration of graphics and spreadsheets into word processing documents. Point and click changes of tab settings and indent settings. Easy to start using with some knowledge of word processing.

Notable weakness(es) of the tool:

Documentation is weak, but probably just a little below the norm. I don't think that the placement nor use of a lot of their options are intuitive. Significantly slows down with documents 100+ pages.

Advice for potential buyers of this tool:

Have one or two people become "guru" on the application and make sure every user at least goes through the tutorial. Would like lower price for quantity buys.

PRODUCT CRITIQUE - REPORT

Product: CICS Test Retrieval System	Critique Author: Andy Norrell
Vendor: MacKinney Systems	Main Duties: Install, maintain, customize and debug MVS and CICS operating systems.
Version: 4.0	Yrs. software experience: 13
Hardware platform:	Yrs. experience with tool: 6 months
Operating system:	Last time tool was used: Currently
Memory used: 26 MB	Author considers self software: Programmer
Disk Space used:	
Enhancements:	

Environment of use: CICS
Project description: Find replacement for interactive VM help facility.
Overall impression of this tool: Excellent
Quality of vendor support: Excellent

Notable strength(s) of the tool:
Ease of installation, customization and use. Very flexible, easy to modify.

Notable weakness(es) of the tool:
None.

Advice for potential buyers of this tool:
Input is 80 byte card records.

PRODUCT CRITIQUE - REPORT

Product: EDCS II Vendor: Digital Equipment Corporation Version: 2.2 Hardware platform: VAX Operating system: VMS Memory used: Disk Space used: Enhancements:	Critique Author: Carolyn Drudik Main Duties: Maintain and update software documentation for two subsystems. Yrs. software experience: 8 Yrs. experience with tool: 3 Last time tool was used: May 1993 Author considers self software: Programmer
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Environment of use:
Project description: Post Deployment Software Support (PDSS)

Overall impression of this tool: Good.
Quality of vendor support: Good

Notable strength(s) of the tool:

Moderate price vs. competition. High flexibility in creation/manipulation of review process (teams, paths, etc.). Allows pointers to remote files, hard-copy documents, etc.

Notable weakness(es) of the tool:
Poor DEC forms interface (use DCL or X-windows interfaces instead). When element is removed from the system, all linkages (dependencies, group membership, etc.) must be deleted first. Some problems encountered with loading multiple entries using files.

Advice for potential buyers of this tool:

Good product for the price.

PRODUCT CRITIQUE - REPORT

Product:	FrameMaker	Critique Author: Wayne Shupe Main Duties: Integrating FrameMaker with other tools to facilitate code editing and debugging, compilation, CM, testing and documentation Yrs. software experience: 10 Yrs. experience with tool: 3 Last time tool was used: Currently Author considers self software: Engineer
Vendor:	Frame Technologies	
Version:	4.0	
Hardware platform:	SunSPARC	
Operating system:	Solaris 2.2	
Memory used:		
Disk Space used:		
Enhancements:	None	

Environment of use:	Development language is C++. Software Through Pictures and OMTool are used to assist in analysis and design.	
Project description:	Developing integration test software to support F-16 software integration testing	
Overall impression of this tool:	Excellent	
Quality of vendor support:	Good	

Notable strength(s) of the tool:	Hyperlinks allow the reader to jump various locations in a document
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Notable weakness(es) of the tool:	Some users find that the graphical user interface (GUI) is unusual. It requires some time to become accustomed to the GUI.
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Advice for potential buyers of this tool:	Take the time to learn how to use the tool as it is very capable.
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Appendix E:

Reserved

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Appendix F:
Training and Services

Information Mapping, Inc.

300 Third Avenue
Waltham, Massachusetts 02154

Phone: 617-890-7003

CALS/CE Information Center

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161

Phone: 703-487-4721
Fax: 703-321-8199
Bulletin
Board: 703-321-8020

CALS Expo (conference)

Sponsor: National Security Industrial Association
1025 Connecticut Avenue, NW, Suite 300
Washington, D.C. 20036

Phone: 202-775-1440

The CALS Connection (training seminar)

Datalogics, Inc.
441 West Huron Street
Chicago, IL 60610

Phone: 312-266-4444

Tech Doc (conference)

Sponsor: Graphic Communications Association
100 Daingerfield Road
Alexandria, VA 22314-2888

SGML '92 (conference)

Sponsor: Graphic Communications Association
100 Daingerfield Road
Alexandria, VA 22314-2888

SGML Tutorial

Instructor is Mr. Jamie Haycox
CALS Program Office

Phone: 513-257-3085
DSN 787-3085

DoD-STD 2167/2168 Seminars

Topics include the basic purpose and applications
of the standards, soft spots in 67A and 68, Ada and
AI/ES issues, tailoring concepts, documentation
approaches, high leverage cost and schedule areas.
Sponsor: David Maibor Associates, Inc.
Needham Heights, MA.

Phone: 617-449-6554

**Insight/2167A On-line Training Aid for
DoD-STD-2167A (software)**

Explains each requirement and key concept in 2167A; \$99.

Logicon, Inc.

P.O. Box 81985

San Diego, CA 92138-1985

Phone 619-587-4781

Understanding DoD-STD-2167A (one day seminar)

DoD-STD-2167A Software Development Projects

(5 day seminar)

Document Production for DoD-STD-2167A

(2 day seminar)

Advanced Technologies Applications Inc.

3528 Torrance Blvd., Suite 214

Torrance, CA 90503

Phone 310-316-6350

Seybold Seminars

Box 578

Malibu, CA 90265-05782

Phone 800-433-5200

Keye Productivity Center

Technical Writing Seminars

Phone 800-821-3919

Document World 94

(Sept. 21 & 22)

Phone 800-753-9776

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Appendix G:

Glossary

API (application program interface) is software that an application uses to communicate with an operating system or database. APIs can be used to extend the functionality of applications like documentation tools.

ASCII is the acronym for American Standard Code for Information Interchange. The ASCII code allows a standard representation of text characters in an electronic form.

Bezier curves in computer graphics are curves calculated mathematically to connect separate points in smooth, free-form curves and surfaces of the type needed for illustration programs and CAD models. Bezier curves need only a few points to define a large number of shapes, hence their usefulness over other mathematical methods for approximating a given shape.

Bit-mapped cartridges plug into a printer to provide bit-mapped fonts, expanding the available fonts beyond those that reside in the printer.

Bit-mapped soft fonts are fixed size fonts stored on disk or in a printer cartridge. They tend to be readily available for most applications and printers, require a lot of disk space, and can be slow because of the time required to download them from disk at print time.

Blocks are the basic subdivision of a subject matter, replacing the paragraph as the fundamental unit of analysis and presentation in functional and task oriented text.

CAD is the acronym for Computer-Aided Drafting and refers to programs used to create two or three dimensional graphics used as models in various engineering, scientific and architectural tasks.

CALS is the acronym for Continuous Acquisition and Life-Cycle Support. Established in 1985 by the DoD, CALS is a DoD/Industry strategy for the transition to automated interchange of technical data and to the process improvements enabled by automation and integration.

CASE is the acronym for Computer Aided Software Engineering and refers to software products designed to automate one or more of the various phases of the software development process.

CCITT is the acronym for Consultative Committee on International Telegraphy and Telephony, a United Nations committee which recommends the use of international communications standards.

CD-ROM is the acronym for Compact Disc Read Only Memory. CD technology is used for recording audio, video, text and graphical information.

CGM is the acronym for Computer Graphics Metafile. MIL-D-28003: CGM is a CALS standard that includes two dimensional technical illustrations and graphic art.

Chunks are any familiar pattern. Chunk size varies with ones prior learning.

Client is a process, e.g. a word processor, that requests a service provided by another program. In a client/server architecture, the requested service would be located on the server.

Client/server architecture is an arrangement used on local area networks to exploit the computing power of the server and client. Processing of an application such as a desktop publisher is split, allowing the client to perform user interaction functions while the server performs centralized multi-user functions.

Clip art is a collection of graphics stored electronically. Any of the graphics may be cut and subsequently pasted into a document.

CMM is the acronym for Capability Maturity Model for Software.

Columns are vertically oriented sections of text. Columns make reading easier by keeping lines of text shorter, while allowing you to print a lot of text on a page.

Compound document refers to the integration of several elements to form a single document. The elements may include graphics, tables, spreadsheet or database information as well as text.

Cropping is selecting only the desired portion of an image for inclusion on a document.

CSC is the acronym for the DoD-STD-2167A Computer Software Component which is a software subsystem. Two or more such subsystems form a Computer Software Configuration Item (CSCI) software system.

CSCI (see CSC).

CSOM is the acronym for the DoD-STD-2167A Computer System Operator's Manual which provides detailed procedures for initiating, operating, monitoring, and shutting down a computer system.

CSU is the acronym for the DoD-STD-2167A Computer Software Unit which is a software module. Two or more such modules form a Computer Software Component (CSC) which is software subsystem.

Database publishing refers to the production of documenting using automated methods to extract information from a database for inclusion in that documentation.

De facto standard is any widely used method that has not been officially recognized by an established standards organization.

Design record is a collection of information, usually in an on-line repository, to support software evolution [Arnold 93]. Some Software Engineering Environments and CASE tools use a design record approach. In some cases, the contents of the design records can be exported to a desktop publishing product to produce a document. In others, no such facility is provided. Access to the captured information is through queries and reports.

Desktop publishing refers to the production of documentation using a workstation or PC running publishing software. The term "desktop" is indicative of the fact that the workstation or PC and an attached output device, like a laser printer, can all fit on a desk.

DID is the acronym for Data Item Description which details the content of deliverables under DoD-STD-2167A.

Dingbat is the collective name for all symbols and ornaments, such as stars, pointing fingers and arrows (i.e. ✂ ✕ ● □ ◆ ☿).

Dithering is a technique used in computer graphics to create the illusion of varying shades of gray (on a monochrome display or printer) or additional colors (on a color display or printer) [Microsoft 91].

Document imaging is the use of bit-mapped replicas of paper documents.

DoD-STD-2167A is the Department of Defense Standard, Defense System Software Development. This standard establishes uniform requirements for software development that are applicable throughout the system life. The requirements of this standard provide the basis for Government insight into a contractor's software development, testing, and evaluation.

DoD-STD-2168 is the Department of Defense Standard, Defense System Software Quality Program. This standard contains requirements for the development, documentation, and implementation of a software quality program.

DoD-STD-7935 is the Department of Defense Standard, DoD Automated Information System (AIS) Documentation Standards. An effort is underway to combine DoD-STD-7935 and DoD-STD-2167A.

Downloadable fonts are bit-mapped soft fonts; they are called "downloadable" because they are transferred from the hard disk or cartridge to the printer at print time.

DPI (dots per inch) refers to the resolution of a device (usually a printer) in displaying information. 300 DPI is typical for laser printers.

Dropped Initial refers to a print style that uses an enlarged first character of a paragraph so that the character occupies multiple lines.

DTD is the acronym for Document Type Description. A DTD defines the structure and content of an SGML document.

DTP is the acronym for Desktop Publisher. DTPs are software tools that provide full screen editing (often with a WYSIWYG interface), graphics manipulation and editing, graphics anchoring to text, multiple text columns, font variety, structuring of complex documents, kerning, and leading control, and may provide close coupling to CASE tools and Software Engineering Environments.

EBCDIC is the acronym for Extended Binary Coded Decimal Interchange Code which is a scheme for representing characters in IBM computers. EBCDIC is analogous to ASCII in general concept but uses 8 bits per character rather than the 7 bits used by ASCII.

EDI is the acronym for Electronic Data Interchange and refers to the ability to transfer orders and invoices electronically.

FIPS is the acronym for Federal Information Processing Standard referring to various standards for data communications.

Font refers to the characters available for a specific style (bold, italic), and point size (10 points) of a character. See "bit-mapped" and "soft font". Note that typeface refers to the design of the characters.

Font cartridges plug into your printer to provide bit-mapped or scalable fonts.

Footer refers to text appearing at the bottom of a page, such as a page number or a chapter title.

FOSI is the acronym for Formatting Output Specification Instance. The FOSI specifies the format and style of an SGML document.

FSM is the acronym for the DoD-STD-2167A Firmware Support Manual, which provides information necessary to load software or data into firmware components of a system.

Full-text search is the ability of a system to find any words and groups of words within documents.

GOSIP is the acronym for Government Open Systems Interconnection Profile, which is the United States government computer protocol for communication and interoperation.

Graphics are art and other elements (including type) used on a page as a visual statement.

Groupware (see workgroup).

GUI is the acronym for Graphical User Interface. GUI is a generic term referring to a screen presentation that accepts user input via a pointing device (e.g. a mouse) and uses graphic representations (e.g. icons) in conjunction with text to communicate with the user. Microsoft Windows, DECwindows, OSF/Motif, and Open Look are examples.

Gutter is the white space in between columns of text on a page.

Hanging Indent refers to a paragraph style in which the first line extends to the left farther than the subsequent lines of the paragraph.

Hardcopy is documentation printed on paper rather than displayed via some other media such as a display screen.

Header refers to a line of text (such as the document title, section heading, document number, or page number) appearing at the top of a page.

Hypertext is the ability to link any place in text stored in a computer with any other place in the same or different texts, that permit rapid access through buttons and other tools across non-linear pathways [Horn 92].

Hypermedia is an extension of the idea of hypertext that incorporates other components such as video, illustrations, diagrams, voice and animation, and computer graphics. Typically an author creates computer-supported links between text, graphs, diagrams, photographs, video, music, film and other media [Horn 92].

IETM is the acronym for Interactive Electronic Technical Manual and refers to a technical manual using hypertext/hypermedia to provide a reader rapid access to information in an intuitive rather than linear fashion. Typical features of an IETM include a graphical point and click interface, table of contents, index search and bookmarks. Information may include video, audio and animated forms.

IGES is the acronym for Initial Graphics Exchange Specification. MIL-D-28000: IGES is a CALS standard including three dimensional technical illustrations and engineering drawings.

Imaging refers to the processes involved in the capture, storage, display, and printing of graphical images. [A raster image of a page of text is a graphical image]. Imaging, especially in such areas as CD-ROM technology, can involve complex and highly detailed procedures, including scanning and digitizing photographs, determining the optimum size and resolution of the image, and compressing the digital description of the image to save space [Microsoft 91].

IDD is the acronym for the DoD-STD-2167A Interface Design Document that specifies the design of one or more interfaces between one or more software systems and hardware systems.

IRS is the acronym for the DoD-STD-2167A Interface Requirements Specification that specifies the requirements for one or more interfaces between one or more software systems and hardware systems.

ISO is the International Organization for Standards (not International Standards Organization). The group is composed of representatives from member countries who strive to develop international standards for electronic data exchange.

IV&V is the acronym for Independent Validation and Verification.

Justification refers to the white space on the left and right side of a page or column. Text may be lined up flush against both of these "margins"; often a ragged format is used against the right margin.

KPA is the acronym for Key Process Area of the Software Engineering Institute's Capability Maturity Model for software development.

Kerning refers to altering the spacing between specific pairs of text characters. Automatic kerning is typical of DTPs.

Layout is the placement of all elements, including text and graphics, on a page. The sizes and styles of type, the positions of illustrations, spacing, and general style are defined in the layout.

Leading is the space between lines of text. DTPs usually vary the leading for a document automatically.

Lexicons are alphabetical listings of the words in a language. For example, a lexicon of the French language. Lexicons may include definitions.

Macro is a set of keystrokes recorded and assigned to a single key stroke. Macros are useful for performing repetitive functions on documentation tools.

Markup Language is a language defining the format and structure of text.

MCCR is an abbreviation for mission critical computer resources.

Meta data is data about data. A keyword used to facilitate text retrieval is an example of meta data.

Multimedia is the combination of sound, graphics, animation, and video.

OCR is the acronym for Optical Character Recognition. OCR technology allows hardcopy text to be converted to an ASCII format that is editable by word processors and desktop publishers.

Operating system refers to software that controls the basic operations of the computer such as usage of memory, disk space, processing time, and peripherals (keyboard, printer, monitor etc.). The price and functionality of documentation tools are often related to the complexity and capabilities of the operating system of the host computer.

Outline fonts (see Scalable soft fonts).

Orphan is the last line of a paragraph located at the top of a new page or column.

Page Description Language (PDL) is a programming language used to describe output to a printer. The printer constructs text and graphics to produce the required page image based on the PDL instructions.

Page Composition (see Layout).

PERT (*Program Evaluation and Review Technique*) is a project scheduling method.

Point size is the size of a particular font where point is the smallest typographical unit of measurement equal to about 1/72 of an inch.

PostScript is one of many page description languages; PostScript is a de facto standard.

QA is the acronym for Quality Assurance.

Raster or bit-mapped is a method for producing images; it is the method used for fax transmission. The conversion algorithm from hardcopy to an electronic raster image is a simple mapping function (advantageous for designers of conversion tools) but the resulting image is difficult to edit.

Resident fonts are the fonts that come built into a printer.

Resolution is the fineness or clarity with which a system can render an image. Printer resolutions are expressed in dots per inch (DPI); the greater the DPI the finer is the resolution. Display resolutions are expressed two dimensionally in pixels; a typical PC monochrome screen's resolution is 720 pixels across by 350 pixels down. The greater the number of pixels the finer the resolution.

RISC is the acronym for Reduced Instruction Set Computing, which refers to a computer design that emphasizes speed of execution by using relatively few types of computer instructions.

Sans-serif is a font or character of a font which does not include short lines stemming from the type characters; for example, Helvetica.

Scalable soft fonts are font outlines generated by programs. Unlike bit-mapped fonts, scalable fonts are not restricted to set point sizes. The scalable font programs may reside on the hard disk or in a cartridge that plugs into the printer.

SDD is the acronym for the DoD-STD-2167A Software Design Document describing the complete design of a software system.

SDP is the acronym for the DoD-STD-2167A Software Development Plan, which describes a contractor's plan for conducting software development.

SEE is the acronym for Software Engineering Environment and refers to a software based system which provides automated support for the engineering of software systems and for the management of the software development process.

SEI is the acronym for Software Engineering Institute.

Serif is a font or character of a font that includes short lines stemming from the type characters; for example, the text you are reading.

Server refers to a computer on a local area network running administrative software that controls access to all or part of the network and its resources (such as printers or disk drives).

SGML (Standard Generalized Markup Language) is a markup language for expressing context-free document descriptions. The requirements for SGML are specified in MIL-M-28001A. Just as ASCII can be transferred from machine to machine, SGML can be transferred from word processor to word processor. But where ASCII is straight text, SGML includes tags to identify structure such as titles, paragraph types, footnotes, etc.

SMG is the acronym for Software Management Guide which is a document published by the Software Technology Support Center to guide government project managers of software acquisition efforts.

SPC is the acronym for Software Product Committee; the committee is comprised of government and industry volunteers attempting to apply CALS to the development, delivery, and maintenance of software products developed under DoD-STDs 2167A and 7935A.

SPM is the acronym for the DoD-STD-2167A Software Programmer's Manual which provides information for understanding the instruction set architecture of the specified host and target computers.

SPS is the acronym for the DoD-STD-2167A Software Product Specification, which consists of the Software Design Document and source code listings for a software system.

SQPP is the acronym for the DoD-STD-2168 Software Quality Program Plan (SQPP), which describes the contractor's plan for implementing quality control procedures.

SRS is the acronym for the DoD-STD-2167A Software Requirements Specification, which specifies the engineering and qualification requirements for a software system.

SSDD is the acronym for the DoD-STD-2167A System/Segment Design Document, which describes the design of a system/segment and its operational and support environments.

SSS is the acronym for the DoD-STD-2167A System/Segment Specification, which specifies the requirements for a system or a segment of a system and becomes the functional baseline for the system or segment.

STP is the acronym for the DoD-STD-2167A Software Test Plan, which describes the formal qualification test plans for one or more software systems.

STR is the acronym for the DoD-STD-2167A Software Test Report, which is a record of the formal qualification testing performed on a software system.

SUM is the acronym for the DoD-STD-2167A Software User's Manual, which provides instructions sufficient to execute a software system.

Typeface is a specific character design such as Courier or Helvetica. Printer and display typefaces are separate entities due to the resolution differences of the devices.

VDD is the acronym for the DoD-STD-2167A Version Description Document which identifies and describes a version of a software system.

Value-Added Networks (VANs) are networking service organizations that provide electronic mailboxes. Such a service allows small organizations to implement EDI. The electronic mailbox allows a sending organization to electronically distribute to many receiving organizations via a single phone call using a single modem and one protocol. AT&T and Bell Atlantic provide such services.

Vector is a method of producing images; especially line art. Vector graphics are easier to edit than raster graphics.

White space is the vacant area between objects on a page.

Widow is the first line of a paragraph appearing as the last line of a page or column.

Workgroup or *Groupware* refers to software products that run on a local area network and that emphasize the sharing of data among project members.

WYSIWYG is the acronym for "What You See Is What You Get", referring to a display that closely resembles the printed equivalent. Displays and hardcopy are not identical because the resolutions of display devices and printers are different.

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Appendix H:

**References and
Recommended Readings**

[Arnold 93]

Arnold, Robert S., Slovin, Malcolm, and Wilde, Norman "Do Design Records Really Benefit Software Maintenance" *IEEE Proceedings*, 1993.

[Barker 91]

Barker, Thomas T. *Perspectives on Software Documentation:Inquiries and Innovations*, Baywood Publishing Company, Inc., Amityville, N.Y., 1991.

[Basili 84]

Basili, Victor R., and Perricone, Barry T., "An Empirical Investigation ," Communications of the ACM", Vol. 27, No 1, 1984.

[Basili 91]

Basili, Victor R., and John D. Musa, "The Future Engineering of Software: A Management Perspective," *IEEE Computer*, September 1991, p. 95.

[Brewin 91]

Brewin, Bob, quoting Paul Strassman, "Corporate Information Management White Paper," *Federal Computer Week*, September 1991, p. 10.

[CALS Journal]

CALS Journal: The Quarterly Forum for the International CALS Community, CALS Journal, Inc., Saratoga, CA.

[Close-up]

CALS Close-up, Air Force CALS Program Office, Wright-Patterson AFB, Ohio. DSN 787-3085, 513-257-3085.

[CSDL 93]

Using the Software Document Evaluation Guidelines, Charles Stark Draper Laboratory, Inc., June 1993

[CTN 91]

CALS Test Network Handbook, Department of Defense, July 1991.

[DOC 92]

Crosby, Dave, *Documentation Tools Report*, Software Technology Support Center, 1992.

- [DOC 93]
Petersen, Gary, *Documentation Tools Report*, Software Technology Support Center, 1993.
- [DoD2167]
DoD-STD-2167A, *Defense System Software Development*, 29 February, 1988.
- [DoD2168]
DoD-STD-2168, *Defense System Software Quality Program*, 29 April, 1988.
- [DoD7935]
DoD-STD-7935A, *DoD Automated Information Systems (AIS) Documentation Standards*, 31 October 1988.
- [DOMAIN 93]
Domain Review of the F16 A/B Head-up Display (HUD) Operational Flight Program, Software Technology Support Center, April 1993.
- [ELECTRONIC PUBLISHING]
Electronic Publishing and Type World, PennWell Publishing Company, Tulsa, OK.
- [EST 93]
Barrow, Dean, *Software Cost Estimation Technologies Report*, Software Technology Support Center, 1993
- [FIPS105]
Federal Information Processing Standards Publication 105, *Announcing the Guideline for Software Documentation Management*, 6 June 1984.
- [Fowler 88]
Fowler, Pricilla, and Stan Przbylinski, *Transferring Software Engineering Tool Technology*, IEEE Computer Society Press, Washington D.C., 1988.
- [Freedman 91]
Freedman, Alan, *Electronic Computer Glossary*, The Computer Language Company Inc., 1991.
- [Goldfarb 90]
Goldfarb, Charles F., *The SGML Handbook: The annotated full text of ISO 8879-Standard Generalized Markup Language*; 1990.
- [Guide 92]
Evaluation Guideline -- Instructions (draft), 6 October 1992 Version.
SM-ALC/LATE, McClellan AFB, CA 95652
- [Hager89]

Hager, James A., "Software Cost Reduction Methods in Practice," IEEE Transactions on Software Engineering", Vol. SE-15, No. 12, 1989.

[Hammer 91]

Hammer, Michael, "The Last World," *Computerworld Premier 100*, September 1991, p. 80.

[Hewson 88]

Hewson, David, *Introduction to Desktop Publishing: A Guide to Buying and Using a Desktop Publishing System*, Chronicle Books, San Francisco., 1988.

[Horn 89]

Horn, Robert E., *Mapping Hypertext: Analysis, Linkage, and Display of Knowledge for the Next Generation of On-Line Text and Graphics*, The Lexington Institute, Lexington, Massachusetts 1989.

[Koch92]

Koch, Gunther R. "Software Engineering as an Organizational Challenge," International Workshop Proceedings, 1992.

[McCauley 92]

Bob McCauley quoted in: "Using Documentation As a Life-Cycle Tool", *Software Magazine* Dec 1992, p41 (6).

[Meyer 92]

Jim Meyer quoted in: "Using Documentation As a Life-Cycle Tool", *Software Magazine* Dec 1992, p41 (6).

[Microsoft 91]

Microsoft Press Computer Dictionary. Microsoft Press, 1991.

[MIL 90]

MIL-M-28001, *Military Specification: Markup Requirements and Generic Style Specification for Electronic Printed Output and Exchange of Text*, 20 July 1990.

[Mosemann 92]

Mosemann, Lloyd K., "Ada: Vital to the Industrial Base," Address at the *Ada's Success in MIS: A Formula for Progress Symposium*, George Mason University, Fairfax, Virginia, 14 January 1992.

[Newton 91]

Newton, Harry, *Newton's Telecom Dictionary*, 1991.

[Oman 92]

Oman, Paul and Hagemeister, Jack, "Metrics for Assessing a Software System's Maintainability", Conference on Software Maintenance, 1992

[Parker 90]

Parker, Roger C., *Looking Good in Print: A Guide to Basic Design for Desktop Publishing*, Ventana Press, Chapel Hill, North Carolina, 1990.

[Ressler 93]

Ressler, Sandy, *Perspectives on Electronic Publishing: Standards, Solutions, and More*, Prentice Hall, Englewood Cliffs, New Jersey, 1993.

[PM 92]

Petersen, Gary, *Project Management Tools Report*, Software Technology Support Center, 1992.

[Poston 84]

Poston, Robert M. "When does more documentation mean less work?". *Software Standards*, IEEE Software, October 1984.

[Proceedings 91]

Proceedings of the CALS Expo '91 Conference and Exposition, 1991.

[Report 91]

Report of the Computer-Aided Acquisition and Logistic Support (CALS) Industry Steering Group (ISG) Software Products Committee (SPC) Near Term Project, November 1991.

[RAD 93]

Bowler, Odean, *Requirements Analysis and Design Tools Report*, Software Technology Support Center, 1992.

[Ramam 88]]

Ramamoorthy, C.V., "Our Job is to Reduce the Errors" From Myers, Ware. "Can Software for the Strategic Defense Initiative Ever Be Error Free?" *IEEE Computer*, Vol. 21, No. 11, 1988.].

[RE 92]

Sittenauer, Chris, *Reengineering Tools Report*, Software Technology Support Center, 1992.

[REUSE 92]

A Report on Software Reuse, Software Technology Support Center, August 1992.

[Rombach 87]

Rombach, H.Dieter and Basili, Victor R., "Quantitative Assessment of Maintenance: An Industrial Case Study", *Proceedings Conference on Software Maintenance*, IEEE, 1987.

[SCHEFF 91]

Scheff, Benson H. and Georgon, Thomas. "Using documentation blueprints to produce mandated DoD data items". *Journal of Systems and Software*, Vol. 14, No. 2, 1991.

[SCSA 93]

Price, Gordon, *Source Code Static Analysis Tools Report*, Software Technology Support Center, 1992.

[SEE 92]

Hanrahan, Robert P., *Software Engineering Environments Report*, Software Technology Support Center, 1992.

[SEYBOLD]

The Seybold Report on Publishing Systems, Seybold Publications, Inc., Media, PA.

[Sisti 93]

Sisti, Frank quoted in: "Government software not up to snuff? Debate sparks a heated argument.", *Government Computer News* 19 July 1993, p2 (2).

[Srivast 94]

Srivastava, Piyush quoted in: "Is Caseware Shelfware?", *Software Magazine* 26 January 1994, p26 (2)

[Simpson 85]

Simpson, Henry and Casey, Steven M. *Developing Effective User Documentation: a Human Factors Approach*, McGraw-Hill Book Company, N.Y. 1985.

[SOFTWARE]

Software Magazine, Sentry Publications, Winchester, MA.

[Sorensen 92]

Sorensen, O. Reed, "Trade-ins for Mentor Graphics Tools," *CrossTalk* Number 34 June/July 1992, pp. 36 and 37.

[Sorensen 94]

Sorensen, O. Reed, "Document Management Awareness is Increasing" *CrossTalk* February 1994, pp. 24-26.

[Sneed 89]

Sneed, H., "The Myth of 'Top Down' Software Development and Its Consequences for Software Maintenance," Proceedings Conference on Software Maintenance, IEEE, 1989.

[SUMMARY 92]

Summary of Changes to DoD-STD-2167A and DoD-STD-7935A Resulting in MIL-STD-SDD, December 1992.

[TECH REPORT]

A Guide to the Classification and Assessment of Software Engineering Tools
Technical Report CMU/SEI-87-TR-10-ESD-TR-87-111, August 1987.

[TONGUE]

AF Pamphlet 13-2, *TONGUE and Quill: Communicating to Manage in Tomorrow's Air Force*, 2 January 1985.

[TPEE]

Price, Gordon, *Test Preparation, Execution, & Evaluation Software Technologies Report*, Software Technology Support Center, 1993.

[Will-Harris 90]

Will-Harris, Daniel, *TypeStyle: How to Choose and Use Type On a Personal Computer*, Peachpit Press, Berkeley, California, 1990.

[Wright 92]

Wright, Haviland, "SGML Frees Information", *Byte Magazine* June 1992, pp. 279 - 284.

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Appendix I:
Document Management
Characteristics

These characteristics are not specific to a single documentation subdomain i.e. they are not intended to define a specific subdomain. Rather, they are an attempt to define the characteristics that may be useful in products used to manage documents.

Access tied to user ID. The product limits access to system objects based on the user identification.

Approximate or pattern match (fuzzy logic). Allows imprecise or ambiguous search criteria to provide an exact hit; for example, a search for "fuzzy" would count "fuzy" as a hit.

Automatic index creation. The product creates indexes to each document based on the contents of the document.

Boolean expressions. Search for strings that meet requirements defined by Boolean operators; e.g. find all > d.

CD-ROM lock. The product can lock CD-ROM drives to deny access.

Check-in/check-out. The product records the identity of those who have write access to a copy of any document. The product also records when such individuals discontinue that access.

Client support. The platforms that the product resides on to perform a client function in a client-server architecture.

Conflict detection. The product identifies conflicts that occur during the version merging process; these conflicts may need to be resolved manually.

Content based retrieval. Retrieval based on the content of the target document rather than based on meta data associated with the target document.

Convert raster to vector. The product converts raster graphics to a vector format.

Crop. A display command that deletes the portion of an image that falls outside of the boundaries of a user defined region.

Definition of review teams. Define which, persons based on user ID, need to review the document.

Dual-page viewing. Allows two pages to be viewed on a single screen simultaneously.

Entity attributes and history. Dates of creation/modification, who made modifications, what modifications were made etc. are maintained and associated with objects under the products control.

Full-text search. The product searches for all occurrences of a user specified string in the document.

Go To First. A display command that quickly displays the first page of the current document.

GUI support. The graphical user interfaces supported by the product.

Hierarchical data structure. Objects are organized in a logical ascending or descending series, as to importance.

Hypertext links. Links that tie logically associated information in a non-sequential fashion.

Integrated Report Writer. Allows hard copies of search results to be generated without exiting the search application.

Inverted index. A file organization in which part of the document (such as title, author) is used as an index.

Keyword or fielded retrieval. The product searches for a keyword or information in a field that will provide the address of the document.

Last. A display command that quickly displays the last page of the current document.

Magnetic media manager. The product allows magnetic media housekeeping functions to be performed without exiting to the operating system.

Manage graphics and text. Allows graphics and text to be stored, retrieved, associated, and/or tracked.

Manage non-electronic data. Pointers are provided to non-electronic data and that pointer is treated as a desktop object; controls access to it, ties attributes to it.

Multi-tasking/windowing. The product supports display of multiple windows in a fashion that appears to be simultaneous to the user.

Native application launch. Documents may be accessed by launching the document's native application.

Netware trustee assignments. The product uses Netware trustee assignments in establishing a secure system.

Network support. The network software the product supports to provide connectivity between client and server.

Next. A display command that quickly displays the next page of the current document.

Non-proprietary Database. The database is compatible with third party products that may be used to further automate an organization's process.

Notification of changes. Based on the team definition for a document the tool notifies team members of the changes to the objects of interest to them.

OCR Conversion. The product converts raster image text to ascii text.

Optical disk manager. The product allows optical disk housekeeping functions to be performed without exiting to the operating system.

Page-by-page viewing. The product allows the user to view the document a page at a time.

Parallel development paths. The product maintains version and revision control of two versions of a single document.

Password protection. Access to the objects under the product's control is restricted based on a password string input by the user.

Previous. A display command that quickly displays the previous page of the current document.

Privilege levels. Ability to read, write, delete are associated with user ID and team definition for a given object.

Protection at character, record and file level. The product can restrict access to data in an object down to the character level based on the user ID.

Proximity search. Allows user to specify two words that must appear within a desired number of words of each other.

Query by example. The user specifies fields to be displayed, intertable linkages, and retrieval criteria directly onto forms displayed on the screen. These forms are a direct pictorial representation of the table and row structures that make up the database. Thus, the construction of a query becomes a simple "checkoff" procedure from the viewpoint of the user.

Rank by relevance (accrual). Objects that scored highest based on the search criteria are listed first.

Rotate. A display command that pivots the current image.

Server support. The platforms that the product resides on to perform a server function in a client-server architecture.

Signature block or electronic signature. The product allows user to pass the document to the next phase or to indicate acceptance of the document.

Soundex matches. A "hit" is defined phonetically rather than by character patterns. For example, *photo* would be a hit if the query entered was *foto*.

SQL support. The product uses one of several commercially available database engines that uses ANSI SQL rather than a database with a closed architecture.

Stage management. Controls the movement of the document from phase to phase; verifying that the appropriate people have signed off. Access to a document is based on the document's phase.

Sticky note commenting. Allows reviews to attach comments to the document.

Thesaurus. Maps data/terminology links for more expansive search alternatives.

True WYSIWYG. What you see on the display screen is what is printed. This must be true for graphics, tables and equations as well as straight text.

Truncation. Allows the user to search for a character string regardless of the remainder of the characters that also constitute the word in which the character string is included.

User defined query. The product allows the user to specify a query and save it for repeated invocations.

Version control. Maintaining multiple versions of a document; supporting the efficient and convenient archiving and retrieval of multiple versions; proving an audit trail of when and why changes were made.

Version merging. The product merges two versions of a document.

Weighted search. Allows the user to assign a relevance weight to search terms.

Wildcard. Search for the specified string without regard for characters adjacent to the string. The syntax for a command line version of this search often uses * to represent one or more characters of any value.

Workflow Management. The products allows document review path definition, reviewer comments, signature block, etc.

Zoom. A display command that enlarges the current image.

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Appendix J:
Capability Maturity Model Documents

LEVEL 2 KPAs	DOCUMENTS
Requirements Management	<ul style="list-style-type: none"> • Allocated Requirements Review • Managing Systems Requirements Allocated to Software Policy
Software Project Planning	<ul style="list-style-type: none"> • Software Development Plan • Software Estimates Procedures • Project Schedule • Software Life Cycle Definition • Software Planning Data • Software Project Activities and Commitments • Software Engineering Facilities and Support Tools Plan
Software Project Tracking and Oversight	<ul style="list-style-type: none"> • Revision of Software Development Plan • Peer Review Plans • Change Requests and Problem Reports Procedure • Formal Reviews of Selected Milestones • Project Tracking and Recording Procedures
Software Subcontract Management	<ul style="list-style-type: none"> • Statement of Work • Software Subcontractor Selection Procedure • Subcontractor Software Development Plan • Subcontract Management Policy • Changes to Subcontractor SOW/Contract/Commitments Procedure • Formal Review of Subcontractor Accomplishments at Selected Milestones • Monitoring of Subcontractor CM/SQA Activities Procedure • Formal Subcontractor Evaluation Procedures • Primes Acceptance Testing of Sub's Products Procedure
Software Quality Assurance	<ul style="list-style-type: none"> • Software Quality Assurance Plan • Policy for Implementation of SQA • Deviations in Software Activities and Software Work Products Procedure • SQA Participation Procedure • SQA Reports • SQA Reviews Procedure
Software Configuration Management	<ul style="list-style-type: none"> • SCM Activities Plan • SCM Policy • Changes to Baselines Procedure • Software Baseline Library Product Creation and Release Control Procedure • Configuration Items/Units Status Review Procedure • Standard Software Configuration Management Reports • Baseline Audits Procedure

Table J-1. Document Types Identified for Level 2 of the CMM

LEVEL 3 KPAs	DOCUMENTS
Organization Process Focus	<ul style="list-style-type: none"> • Assessment Finding Action Plan • Software Development, Improvement, & Training Coordination Policy • Process Database Utilization Policy • New Technology Evaluation /Transfer Procedure
Organization Process Definition	<ul style="list-style-type: none"> • Developing and Maintaining of Standard Software Process and Lifecycle Definitions Procedure • Software Process Tailoring Guidelines • Utilization of Process Database/Library Policy
Training Program	<ul style="list-style-type: none"> • Development and Revision of Organization/Project Training Plan • Training Requirements • Development and Maintenance of Training Courses • Training Waiver • Training Records
Integrated Software Managment	<ul style="list-style-type: none"> • Tailoring of Standard Software Process Procedures • Software Process Revision Procedure • Costs/Dependencies/Risks/Resources Management Procedure
Software Product Engineering	<ul style="list-style-type: none"> • Methods and Tools Integration Plan • Software Requirements, Design, Code, Documentation, Testing Defined and Integrated into Software Process
Intergroup Coordination	<ul style="list-style-type: none"> • Resolution of Intergroup Issues Procedure • Intergroup Commitments Communication Plan • Critical Dependencies Tracking Procedure • Technical Review and Interchange Policy
Peer Reviews	<ul style="list-style-type: none"> • Peer Review Plan • Peer Review Performance Procedure

Table J-2. Additional Document Types Identified for Level 3 of the CMM

LEVEL 4 KPAs	DOCUMENTS
Quantitative Process Management	<ul style="list-style-type: none"> • Quantitative Process Management Plan • Measurement and Control of Data Procedure • Quantitative Control of Process Procedure • Quantitative Process Management Activities Report • Process Capability Baseline Procedure
Software Quality Management	<ul style="list-style-type: none"> • Software Quality Plan • Quantitative Quality Goals Document

Table J-3. Additional Document Types Identified for Level 4 of the CMM

LEVEL 5 KPAs	DOCUMENTS
Defect Prevention	<ul style="list-style-type: none"> • Defect Prevention Activities Plan • Casual Analysis Meetings Procedures • Defect Prevention Data • Defect Prevent Revisions to Standard Software Process Procedure • Defect Prevention Feedback and Activities Report
Technology Change Management	<ul style="list-style-type: none"> • Technology Change Management Plan • New Technologies Report • Technologies Selection and Acquisition Procedure • Application of New Technologies to Standard Software Process Procedure
Process Change Management	<ul style="list-style-type: none"> • TQM Program • Process Improvement Plan • Process Improvement Procedures • Process Improvement Record • Process Improvement Training Plan

Table J-4. Additional Document Types Identified for Level 5 of the CMM